

Nature *Magazine*

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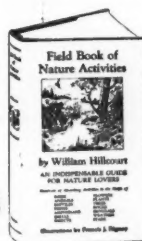
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Nature in Print

By HOWARD ZAHNISER

FOR some reason now obscured (which probably had its origins in the schoolday celebrations of the Lincoln and Washington birthdays that were in red numerals on our February calendars and possibly also in the impressive home observances of my own that same month, though calendered in black) February seems a special time among the books of biography, and its imitator, autobiography. Here, then, on this February page comes quite naturally, as far as I am concerned, a brief discussion of two biographical and memoir volumes that have been for a while on my Nature-in-Print shelf.

Lifelong Boyhood: Recollections of a Naturalist Afield, from the University of California Press, brings the interesting and edifying narrative of Professor Loye Miller, who looks back on his studies of birds and bird fossils and on expeditions in many places, from Oregon to Panama, and concludes in the final sentence of his epilogue: "I am grateful that a kindly Providence has led me in the path of Nature these many days of my life." The volume is the more valuable for including not only Professor Miller's autobiographical writings but also a group of selected writings on birds.

From the University of North Carolina Press at Chapel Hill comes a memorial volume of collected writings (with biographical introduction and editorial notes) entitled *A North Carolina Naturalist: H. H. Brimley: Selections from His Writings*, edited by Eugene P. Odum.

These volumes from the review shelf, biographical as they are, seem the more timely to me because a reading of them has followed the perusal and pondering of C. M. Goethe's unique autobiographical testimony, so well entitled *Seeking to Serve*. After I had enjoyed a (for me) all-too-brief visit in that Sacramento, California, home from which such a profound influence for a better understanding of Nature has radiated, Mr. Goethe graciously sent me this his book, and it has seemed as I have read it that his infectious, inspiring conversation has been continued here in my own home.

From topic to topic the book moves along after the order of unpremeditated reminiscence — spontaneous, profound, casual, and earnest. Whether it tells of the diligence and prudence in American enterprise that earned from real-estate, banking, mining, and agricultural projects the means for service, or of the service itself, *Seeking to Serve* is indeed one of those reminders that Longfellow promised for us in the lives of great men. Of most intimate interest to me has been that service in furthering the use of our national and state parks for the reduction of what Mr. Goethe and his wife called "biological illiteracy." They were the ones who carried over from Europe the movement that, as Mr. Goethe writes, was originally dubbed Nature guiding, but has come to be known as interpretation. Their many other services, however, including their vitally important part in starting the crusade against tuberculosis through Christmas seals, and especially their devoted work in advancing eugenics, are

likewise of inspiration and deep citizen-concern. Here, too, is a loving memorial, an ever tributary reminiscence of the one with whom and often through whom Mr. Goethe found the service he sought. Find it he has, indeed, and many there are who could testify to having become a continuing instrument of this service.

Mr. Goethe's eugenics interest, and also his concern for biological literacy, would be aroused — as perhaps they have been — by the opening words of Professor Miller's "Early Days" chapter, the first of that section of *Lifelong Boyhood* called "Biographical Notes." To the many students, he tells us, who have asked him when his interest in birds began, he has replied: "When my mother was a little girl." It is thus apparent at the outset of this volume that its reading is in all good spirits. It is also apparent what Hildegard Howard had in mind when she remarked in the book's foreword that "the inspiration which every one of his students obtained from Loye Miller's classes in biology have been captured on the printed page." It was, incidentally, part of Dr. Miller's service as an interpreter that helped promote the Nature guiding of which Mr. Goethe has written, and he is among

those who are so honored in *Seeking to Serve*. For Dr. Miller was associated with Dr. Harold C. Bryant in the 1919 "experiment" at Lake Tahoe from which the interpretive movement was introduced into the national park system.

Lifelong Boyhood assuredly serves well those so-called moral purposes of biography that send us to accounts of other men's lives, not only for a satisfaction of our curiosity and an interest in true tales, but also for an enrichment of our own living. Its accounts of the exploring expeditions are tales with a content of knowledge, and its author's reflections are influences for health and a wholesome outlook.

"What is joy, anyway," Dr. Miller asks, "but the ever seeking and the ever finding, the wearying of the muscle and the resting thereafter?" Happiness, he tells us, "lies in the proper satisfying of normal desires," and he tells us so with the ad-

monition to "make sure that the desire is normal and that the means of satisfying it is not out of order."

One feels in reading the volume that Eugene P. Odum has made from the writings of H. H. Brimley some of the same influences that were thus exerted across the continent. Brimley, Dr. Odum remarks, "became one of those rare men who could present facts and observations in an interesting manner without resorting to sensationalism or an overdose of sentimentalism." The content of this volume is a demonstration. One feels throughout that the volume is indeed a memoir. Although it is almost entirely the writings of Mr. Brimley himself which comprise it, one feels that all of these are presented not only for their intrinsic interest but for their revelation of the man who wrote them. The interesting editorial notes by Dr. Odum emphasize this purpose.

The volume's first of the six "parts" in which it is arranged is, in fact, largely reminiscent. Entitled "Early Interests and Explorations," it is composed of Mr. Brimley's writings on such topics as "Old Times on Curruck" and "Cape Hatteras in Storm and Shine." The second part, entitled "Hunting and Fishing," like so many such tales, has likewise the tone of old times, and one feels a pervasive interest in the teller. H. H. Brimley, Dr. Odum tells us, was one of those sportsmen to whom the "actual game obtained" appealed less than did "the long hikes through country unspoiled by man, the chance to get away

Together We . . .

By GERTRUDE SHISLER GREENWOOD

Though winter rightly reigns, together we
Have walked the lowland pasture and have seen
The bold bullthistle's spreading round of green,
Have heard the little stream sing joyously
And felt its ice-fingred waters cold and clean.

And we have followed this bright brook to where
It rises in a marshy well of springs,
And there, to our delight, a cloud of wings,
White edged, blue-gray dip wildly through the air.
Zpce-Zpce! the wee gnat-catcher's thin call rings.

Since these white-breasted birds are back once more,
Our eager spirits race ahead to meet
The first thorn-apple bloom so frail; to greet
The rust-stained dogwood at our wood's green door,
To pluck a visioned violet at our feet.

from petty troubles of complex modern civilization, the matching of wits with cunning wild kindred, the hearty meal cooked in the open, and the companionship around the campfire." (Brimley's tale "Bill's Christmas Bear" ought to prove a good one around such a campfire.) This section, or part, is followed immediately by one on conservation, comprising an article on bird conservation in the South, and one on the history of conservation in North Carolina, introduced by a note in which Dr. Odum speaks especially of Brimley's position as director of the state museum and his association with T. Gilbert Pearson. The concluding part of this memorial volume is devoted to four articles on the museum work and the museum. It follows two parts in which are collected Nature writings by Brimley that are indeed interesting. Outstanding in "Part IV, The Giants of Nature," is a fascinating and informative discussion of "Whales," and "Part V, The Lesser Forms of Life," includes the intriguing account of a phoebe that perched on Mr. Brimley's "hands, sleeves, and gun barrel" and picked from his face the mosquitoes.

One feels as he lays aside this volume that his acquaintance with this North Carolina naturalist has been rewarding, and he is thankful to Dr. Odum for the introduction to Mr. Brimley.

The philanthropist Goethe, the biologist-educator Miller, and the museum director Brimley have all made notable achievements that but for such volumes as these might be known in their significant details by only a fortunate few. To share their fortune through our reading is now a happy privilege of our own.

Lifelong Boyhood: Recollections of a Naturalist Afield. By Loye Miller. Berkeley and Los Angeles: University of California Press. 1950. 226 pp. (5½ by 8½ in.), with foreword by Hildegarde Howard, frontispiece portrait, 2 other photographs, and 2 text figures. \$2.75.

A North Carolina Naturalist: H. H. Brimley: Selections from His Writings. Edited by Eugene P. Odum. Chapel Hill: University of North Carolina Press. 1949. 205 pp. (6¼ by 9 in.), with 44 photographs on 21 plates, and index. \$3.50.

Conserving Soil

Conserving Soil Resources. Compiled and edited by Paul W. Chapman, Frank W. Fitch, Jr., and Curry Lafayette Veatch. Atlanta, Georgia. 1950. Turner E. Smith and Company. 355 pages. Illustrated, \$3.28, with 25 percent discount to schools, teachers and veterans.

The subtitle of this book is "A Guide to Better Living," and conservation and wise use of the soil is certainly the road to such living. While this book is prepared for the schools as a fundamental and introductory text on this vital part of conservation, its distribution should by no means be limited to the school. It is equally a basic text for anyone who wishes to or

should know more about soil conservation. It is to be hoped, however, that a place will be found in school curricula for serious attention to this subject, and this excellent book will answer the need of school authorities with the vision to realize the importance of soil conservation and instruction with respect to it.

Yosemite Valley

The Incomparable Valley. By Francois E. Matthes. Edited by Fritiof Fryxell. Berkeley, California. 1950. University of California Press. 160 pages. Illustrated with 24 photographs by Ansel Adams. \$3.75.

This "geologic interpretation of the Yosemite" was a book long planned by the late Francois Matthes, and its editor and close associate of Matthes intends that it shall be truly the book of his friend. Matthes had sought to provide a volume that would interpret the Yosemite and the Sierra Nevada to all who love the mountains, particularly those who come to see, and seeing, wonder and wish to understand. The author traces the gradual evolution of the valley during successive periods culminating in the three glaciations of the Ice Age, which transformed its features. Other chapters discuss the geological features of the region, and the changes that have taken place in them since the end of the Age of Ice. Ansel Adams' fine pictures splendidly illustrate the end results of these changes.

Flies

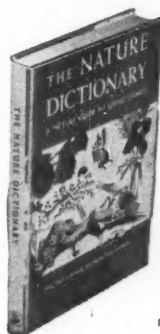
Flies. By J. Edson Leonard. New York. 1950. A. S. Barnes and Company. 340 pages. Illustrated. \$5.00.

This is a book designed to be a reference and guide for fly fishermen. It covers the origin, natural history, tying, hooks, patterns and selection of dry and wet flies, nymphs, streamers, salmon flies for fresh and salt water in North America and the British Isles. The book also includes a dictionary of 2200 patterns.

Children's Magazine Index

"Subject Index to Children's Magazines" is the title of a most helpful periodical edited by Meribah Hazen, 445 West Wilson Street, Madison 3, Wisconsin. Twenty-four magazines are indexed, none of which, except *Nature Magazine*, is indexed in the *Wilson Reader's Guide to Periodical Literature*. Incidentally, when Miss Hazen's excellent index first came to our attention we suggested that *Nature Magazine* is not exactly a "children's magazine." However, as an experienced librarian, she pointed out that many of our articles are immensely useful to school children, and that "the pictures are simply invaluable." Annual subscription price to this service is five dollars a year. The monthly planographed index is cumulated twice a year, in February and August. Back volumes are available at four dollars.

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IN THIS ISSUE

February, 1951

Vol. 44, No. 2

Nature in Print.....	Howard Zahniser	58
By Way of Report.....		62
Contents Noted.....	R.W.W.	63
The Little Vistas (Poem).....	Cateau De Leeuw	64
Nature's Own Children.....	Charles Morrow Wilson	65
Eclipse of the Moon (Poem)		
	Mabel C. Satterthwaite	70
Wintering with Beavers.....	William J. Long	71
The Pecten.....	Ruth Dudley	74
Doe Run Discovered.....	Tom Wallace	75
Heaven's Casement (Poem).....	Maybelle Taylor	76
Dr. Willis Whitney—Truth and Turtles.....	Virginia Veeder Westervelt	77
Miracle in the Grass (Poem)		
	Elinor Henry Brown	79
Life with A Flying Squirrel		
Infant.....	Eliza Robert	80
Glimpses of Flying Squirrels.....	Ernest P. Walker	81
Bird Photo-Quiz.....	Hugo H. Schroder	85
Editorial.....		89
Silent Servant.....	Arthur B. Meyer	90
Morning Wind (Poem).....	Daniel Smythe	91
Edible Flowers.....	Alexander F. Skutch	92
Gourmets (Poem).....	John Nixon, Jr.	93
Birds of Hokkaido.....	William R. Eblen	94
Carp (Poem).....	August Derleth	96
The Miry Palm.....	Alex D. Hawkes	97
Enchanted Mesa (Poem).....	Richard G. Beidleman	98
Tuckahoe — A Fungus		
Hercules.....	Robert Sparks Walker	99
The Zodiacal Light.....	Isabel M. Lewis	100
Moonset (Poem).....	Inez Barclay Kirby	101
Camera Trails.....	Edna Hoffman Evans	102
The School Page.....	E. Laurence Palmer	104
Under the Microscope.....	Julian D. Corrington	110

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"Natural Landscapes of the United States," by J. Francis Macbride is the latest bulletin in the popular series published by the Chicago Natural History Museum, Chicago 5, Illinois. Profusely illustrated, it describes the principal vegetative features of the landscape of our country. Thirty cents, postpaid. . . "Hardy Trees, Shrubs, Plants and Bulbs" is a listing of excellent garden and other planting material by Gardens of the Blue Ridge, Ashford, McDowell County, North Carolina. Free. . . "The Audubon Society of New Hampshire Bulletin," Volume 18, Number 3, contains excellent material. Address 71 Lebanon Street, Hanover, N.H. Membership two dollars a year; price of bulletin fifty cents. . . "Saving the Redwoods," 1949-1950, is a report on the progress of redwood preservation by the Save-the-Redwoods League, 250 Administration Building, University of California, Berkeley, California. . . "Raccoons of North and Middle America" by Edward A. Goldman is North American Fauna 60, published by the U.S. Fish and Wildlife Service and available from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. at 45 cents. . . "The Minnesota Naturalist" makes its appearance in its second number with a colored cover and printed interior, and contains a roster of its membership. Headquarters are 315 Medical Arts Building, Minneapolis 2, Minnesota. . . "Yellowstone Nature Notes," Yellowstone National Park, Wyoming, in its November-December, 1950, issue features an interesting record of geyser and hot spring activity at Norris Geyser Basin made by Ranger Naturalist Merrill David Beal between June 5 and September 10, 1950.

Science and Crime

An Outline of Scientific Criminology. By Nigel Morland. New York. 1950. The Philosophical Library. 285 pages. Illustrated.

Tracking the criminal and pinning his crime upon him to the satisfaction of courts, juries and society has become more and more a scientific activity. In this book the author brings us up to date with respect to the weapons that science has placed in the hand of the criminologist. The result is a book that should be of immense value to writers of detective stories, but is also almost as fascinating to the average reader as a fiction story.

Conservation Movie

"Conservation in Action" is a 15-minute, 16 mm sound and color film released by the U.S. Fish and Wildlife Service. It tells briefly the habitat-needs of salmon, waterfowl, buffalos, mountain goats, moose and other creatures. The film is available to schools, clubs and other organizations. Applications for bookings should be made to the Division of Information, Fish and Wildlife Service, Washington 25, D.C.

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By Way of Report


WHEN the Eighty-Second Congress convened January 2 it was necessary to reintroduce all bills that failed of action by the preceding Congress, including those dealing with conservation issues. Among the proposals that will be stressed early in the session are amendment of the so-called Duck Stamp Act, stabilization of the Pittman-Robertson appropriation, and provision of adequate funds to finance the Wildlife Division of the U.S. Forest Service. A move will be made to provide twenty-five percent of the receipts from the sale of the two-dollar duck stamp for enforcement of the law. Attempt will also be made to assure annual appropriation for Pittman-Robertson work of ten million dollars from the earmarked fund for this purpose derived from the arms and ammunition tax. The Wildlife Division of the Forest Service was cut off without any funds three years ago, making it dependent on whatever money could be diverted to it. The wildlife population of our National Forests is so large that this Division must be adequately financed so that it may carry a great responsibility. We will report here on other legislation as it appears.

TEMPORARILY, at least, the Mount San Jacinto Winter Park Authority has been stymied in its attempt to obtain permission from the Secretary of the Interior for a tramway right-of-way across a part of the San Bernadino National Forest Wilderness Area in California. The Secretary held that the tramway was not

a railroad and that, therefore, he lacked jurisdiction. This invasion of the wilderness area has been actively opposed by conservation organizations, including the American Nature Association. The project is largely academic at the present moment since it certainly would come under the head of construction for amusement purposes, now banned by Federal ruling.

DESPITE agreement and understanding between the Secretary of the Army and the Secretary of the Interior, the threat to Glacier National Park inherent in the proposal for Glacier View Dam on the North Fork of the Flathead River is not dead. This dam would flood an important area in the Park, seriously affecting its wildlife resources. That the issue is still much alive is indicated by assertions from Paul Raver of the Bonneville Power Administration, on a visit to the region of Kalispell, Montana. He declared the Glacier View Dam to be essential, by what right and on what authority we do not know.

ACQUISITION of 125,000 acres of private lands within the boundaries of Everglades National Park in Florida brings the total area of the Park to 1,210,000 acres, and places all land within the boundaries under National Park Service administration. This is reassuring, and clears up a situation that seriously needs clearing up in many other National Park Service areas. Funds for acquisition have always been meager and far below actual needs.



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Contents Noted

ANNUALLY the hunting season brings to our desk a by-product in the form of clippings from newspapers. Most of these, of course, come from people who find no joy in contemplating the yearly invasion of field, forest and farm by those who find pleasure in the kill. And, indeed, many of the newspaper reports reflect little credit on those who choose to call themselves sportsmen, regardless of competence with the gun, judgment in the outdoors, or respect for the property rights of others. All in all, the annual hunting season is not a pretty business, and the annual toll of gunner accidents, mistaken targets, crippled birds and mammals that get away, and other attendant details make many non-hunters who are not necessarily against hunting wonder if, after all, this is truly "sport."

ONE clipping at hand is that of the syndicated column by Margaret Chase Smith, United States Senator from Maine. Sickened by the annual parade of automobiles, their fenders festooned with dead deer, she says: "Hunting is alleged to be a sport. But I can't see any sport in men slipping up on peaceful, defenseless deer and shooting them. . . The deer doesn't have a chance. But, the hunter says, the deer has the chance to run away and dodge the shots. And is that a sporting chance?" Mrs. Smith points out that the pioneers who made this country what it is had to take wildlife to live, and adds: "But there is something deeper, basically, in the killing that hunting involves. It is done for amusement, for 'sport,' merely to satisfy the ego of the hunter and to entertain him. It serves no useful purpose. . . It is one thing to follow man's basic instinct of self-preservation. But it is another to kill for fun."

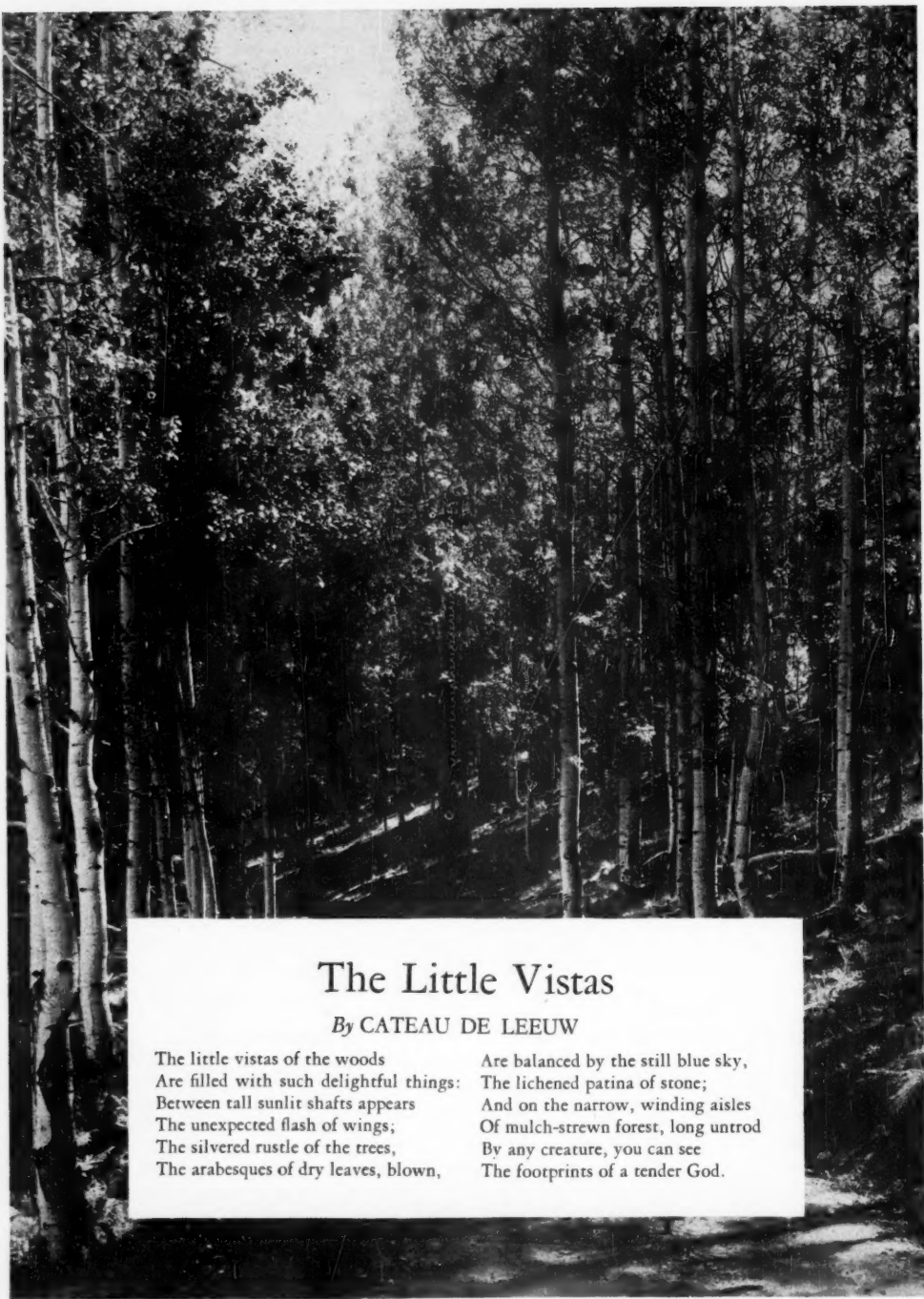
SENATOR Smith anticipated that her remarks would not please certain people, and, of course, they did not. Letters to the editor resulted in such typical comment as came from one gunner who pointed out that "deer hunting is an event many hard-working men look forward to each year." He adds that "deer hunting is the sport of red-blooded Americans, and should never be denied them." Of course, hunting is often extolled as a means of getting the red-blooded fraternity outdoors in pioneering fashion. But, from the same newspaper in which this view is emphasized, comes a picture layout entitled "Shooting in Style." With the pictures is the following text: "Hunting, once a means of livelihood for man, is now the sport of thousands. But, in many cases, the sport is no longer associated with a rugged, outdoor life. Enthusiasts can now find all the big city conveniences in hunting areas equipped with modern hunting hotels. Soft beds replace bumpy cots or sleeping bags, and barber shops, Turkish baths and massage parlors offer means of relaxation after a day of tracking deer through woods."

THERE is, of course, the usual batch of reports of hunting accidents, some freakish, others just plain manslaughter born of ignorance and incompetence in the outdoors. The number of such latter reports annually convince us that no gunner — so long as sport hunting continues to be accepted — should be allowed abroad with a gun until he or she has passed a rigid examination as to ability to carry and use guns with safety to others, and knowledge of wildlife and the laws as to property rights and sportsmanship. There are always freak fatalities, such as that of a young man who had shot a rabbit, wounding it but not killing it. Attempting to club the animal to death with a rifle butt, the hunter shot himself to death. In another case, a New Hampshire man, hunting with a friend, shot and killed his companion, who was returning from a brief sally into a scrub-oak thicket and was carrying a rabbit he had just bagged. Another report involves a fivesome of gunners who engaged in a pitched battle over a bag of pheasants, one participant being badly wounded. Another New Hampshire fatality involved an aged man, wandering along a woodsroad near his home and on his own property. Tired, he apparently had taken a nap on a leafy slope. A gunner, hunting along a ridge nearby, shot and killed the old gentleman. In court the hunter said that he thought he was shooting at a rabbit. Alcohol and hunting yearly prove a fatal combination, also, as the press reports from all over the country.

OTHER stories of the hunting season contain wry humor, such as that of a gunner who had brought down a buck, laid his gun across the animal's antlers and prepared to slit its throat. Whereupon the buck jumped up and took off with the gun. Symbolic of the wastage of wildlife is the story of a man who has a hunting dog but no gun. He uses the dog to hunt crippled ducks and gets his limit of birds daily. Another story describes an elaborate party arranged for twenty-five paraplegic veterans to shoot deer. The correspondent sending in this clipping observes: "You'd think they'd have seen enough of guns!"

PERHAPS the sort of story that irks people most during the hunting season is concerned with the invasion of property rights. Such reports, from property owners of all sorts, are legion. Typical is a story from a Wisconsin resort where the owner maintains a wildlife sanctuary, so marked and posted. Having had extensive experience in the past, however, and fearing for five tame deer, the resort-owner painted the deer's antlers red and wound red ribbons through the spikes. All five, which were so tame they would come right up to the muzzle of a gun, were shot on the opening day of the season. For protection, a tame red fox was provided with a colored leather collar and bedecked with red ribbon. The invaders did not waste a bullet on her. They clubbed her to death and left her entangled in her ribbons, more reddened with her own blood.

R.W.W.



The Little Vistas

By CATEAU DE LEEUW

The little vistas of the woods
Are filled with such delightful things:
Between tall sunlit shafts appears
The unexpected flash of wings;
The silvered rustle of the trees,
The arabesques of dry leaves, blown,

Are balanced by the still blue sky,
The lichen'd patina of stone;
And on the narrow, winding aisles
Of mulch-strewn forest, long untrod
By any creature, you can see
The footprints of a tender God.



The Lacandones, descendants or co-descendants of the Mayas, speak the same rituals of prayer and burn the same incenses to the same gods as did their once mighty ancestors.

Nature's Own Children

By CHARLES MORROW WILSON

WHAT are Nature's children really like? This has long been a special question for anthropologists and other fact-seeking students of man and his behavior. Recently research and field work of the Carnegie Institution has gone far toward answering this basic question.

So far as accredited anthropology knows, the people who are closest to Nature, and therefore the most "primitive" in the world today, live within three flight hours of United States' boundaries. They are Indians — tranquil farming and forest Indians called Lacandones. They are, also, isolated and far rural descendants, or co-descendants, of the once illustrious and mighty Mayas, whose great empire period, which began at about the Seventh Century, A.D., and lasted through

the Thirteenth Century, became one of the more distinguished civilizations of man.

The Lacandones are the last of the real Mayas; the only living people who continue to speak the ancient Maya language, otherwise a "dead" language. Like the great Mayas of old, the Lacandones are white-robed and unbarbered dwellers in a continuing Stone Age. They continue to worship in the ruins of what were once the magnificent stone temples of the Mayas. They make the same devoted pilgrimages to the same ancient shrines, particularly Yaxchilan, a great city of temples, now completely in ruins. Lacandones still speak the same rituals of prayer, and burn the same incenses to the same gods as did the once mighty Mayas.

The olden Mayas were preponderantly small-plot



A Lacandon man, member of the Getja clan.



A Lacandon woman of the village of Miramar.

farmers, foresters and hunters. So are all the Lacandones, who remain free to roam the great and almost unbelievably sparsely settled *desiertos* of Chiapas, Mexico's foremost Indian state. They also hunt or roam, as they see fit, through the wild semi-jungles of Guatemala's little known Peten Territory.

The largest and most amazing of the hideaway places of the Lacandones is the green-misted valley of the Lacanha River. This is an epochal lost valley. Steep, bluff-lined mountains shut it off from east and west. Mile after mile of virtually impassable swamps, marshes and quicksand flats blockade its lower end. A succession of no fewer than 200 lakes and ponds, many intermerged, further barricade the entrances.

Accordingly, the Lacanha Valley is really a lost world, and a particularly lush haven for wildlife of many kinds. Within it, tapirs and howling monkeys, ordinarily rare and elusive, are plentiful and unafraid. The same is true of wild turkeys, which are so abundant that one can actually pick them up.

Reptiles are comparatively rare, although occasionally one comes upon oily looking, blackish logs that turn out to be boa constrictors. But the animal life — including forest deer, wild hogs, armadillos, lemurs, and anteaters — is immensely abundant. Fishes literally crowd the rivers, lakes, and ponds, and there are multitudes of large turtles. Ibises, flamingos, herons, and other water birds are countless on lakes and ponds, and brilliantly colored hummingbirds, red-and-blue macaws, and large green parrots, live and frolic in the riverside forests.

Plant life is luxuriant. The cornstalks, for example,

which bear thin and multi-colored ears, shoot to heights of sixteen feet or more. Native squashes frequently grow as big as our prized pumpkins, while the aboriginal yams may fill a peck measure. Plants of the age-old strains of cotton — the ripened fiber more frequently brown than white — grow shoulder high.

Rather surprisingly, however, at least to the outsider, the Lacandones are an exceptionally small people. The men are rarely more than a few inches above five feet, and the women are usually shorter. Although sturdy, broad-shouldered, and well-muscled, the Lacandones are rarely fat. Yet, although their legs are short, they walk with rapid, ground-gaining strides through the roadless forests, setting a pace that puts the average athletic white man breathless and perspiring within half an hour.

The Lacandones continue to hunt quite successfully with bow-and-arrow, and to chip their own arrowheads and spearheads from heated flint and other kinds of rocks. They continue to wear the same kind of home-woven white robes, or togas, that the ancient Mayas apparently wore. For reasons of ritual and tradition, the Lacandones never cut their hair. The newcomer frequently finds himself unable at first glance to tell the sexes apart, this despite the Lacandones' intense awareness of sex and the prerogatives thereof. Thus these own children of Nature are tradition-bound, but they are not naive, and they are very self-reliant and resourceful.

Even so, these "lost Mayas" have long been a vanishing people. In 1905, a party of respected anthropologists, headed by Tozzer of Harvard, completed a fairly

A Lacandon pilgrim stands before a stela, or date stone, of the ancient Mayas.

reliable, painstaking counting of all the Lacandones then living, or findable. The count then was slightly more than 600. It now has fallen to barely 130 — all Mexicans, except four who live within the Peten Territory of Guatemala.

Although we know approximately how many Lacandones remain, we do not know how long they have lived in the remarkable lost world of frontier Chiapas. One of the most respected students of American Indian life, Dr. A. V. Kidder, head of the historical division of the Carnegie Institution of Washington, D.C., considers it possible that the forebears of the still reclusive Lacandones may actually predate the Mayas of the Great Empire period. Certainly, the Lacandones, in regard to art, mathematics, and architecture, are much more primitive than were their illustrious empire-building ancestors.

The Lacandones are an exceptionally gentle people. They do not bash or smash each other with clubs, or rocks, or fists. There is no evidence that they spank their wives. The men are preponderantly manly; the women are womanly. Multiple wives are permitted, but they exist only in a few instances because of clan taboos, and because among the Lacandones there are fewer women than men. This is apparently because of the many deaths in childbirth.

Lacandon women do the cooking and take care of the homes. The men do all the hunting, most of the fishing and most of the farm work, including all heavy work, such as felling trees to clear the garden fields. The men are the priests and "messengers" from and to the gods. But the women own most of the household and other belongings. They cook and serve the food. A man, whether young or old, is entitled to demand a full meal, or a snack, at any hour of the day or night. In the latter exigency, the wife or housekeeper rises obediently from her hammock, (as a rule the Lacandones sleep in swinging hammocks) and serves the meal.

Violent crime is unknown among these own children of Nature. They are the most honest people I ever



knew. Their respect for the property of others is clear-cut, and the Lacandones are remarkable as tellers of the truth. Recently a Carnegie archeologist asked the interpreter (one of the few, perhaps the only Lacandon half-caste living), to ask one of the white-robed family heads what he was thinking about. The answer was as straight as a Lacandon arrow: "I was just wondering when you strange, rude people are going to get out of here and leave us alone. . ."

The rediscovery of the Lacandones is heralded throughout the world of anthropology as the most impressive find of truly primitive man during the present century. While the general trend is toward an unified Mexico, the white-robed Lacandones are the extreme examples of Mexicans who never heard of Mexico. None of the Lacandones displays any acquaintance with the Mexican Government, either national or local. Its flag, anthem, or other tokens of its authority mean nothing to these Mayan descendants. There has never been an official Mexican census of the Lacandones,

who speak neither Spanish nor English.

The Lacandones adhere to the Mayan language as faithfully as they follow the classic religion of the Mayas of old. They worship the same ranks and families of gods; they mold and maintain the same burnt-clay "god pots" in which they burn the same classic incenses. With olden prayer boards in hand, they speak the same lengthy, highly lyrical prayers. At nine-month intervals, they make the same devout pilgrimages afoot to the ruins of once-great Maya temples of Yaxchilan.

Unlike the Mayas of the Great Empire era, the Lacandones have no merchant princes or traveling caravans of trade. Their commerce is local, primitive, and without money.

Lacandon women and children still mold by hand and enjoy the same styles of homemade clay dolls that Maya children made and played with fifteen centuries ago. Like the olden Mayas, the men still build highly dispensable huts of slender poles, lashed together with raffia or other tough fibers, and thatched with native palm leaves. Built in a few days, these huts are as promptly abandoned when and if the needs of hunting, fishing or farming require. After sickness, the Lacandon burns his hut, and builds a new one. Frequently, too, if the hut is contaminated by the presence of crass white men or wandering *chiceros* (chicle harvesters), or if any one of the latter sneezes or coughs within its confines, the householder burns the hut and builds anew.

As a traditionally healthy citizen, without any major diseases (even malaria, the traditional curse of the tropics, is virtually unknown) the Lacandon especially fears colds and pneumonias as suffered by white men. The Lacandon believes health is the normal state of life. Because hunting is inherently hazardous, the Lacandon has long since learned to set broken bones with homemade splints, and to treat flesh wounds with fresh earth or leaf poultices. But many Lacandones have never known any disease other than the inevitable disease of old age; the majority have never suffered a common cold.

These children of Nature also excel as farmers. Their farming practices closely parallel those of the Mayas of old. Corn, or "Maya Maize," remains the principal, ever-sustaining crop. The strains of corn still in cultivation appear to be hundreds, or perhaps thousands,

of years old. Even so the yields are heavy and the stalks tower high.

Early each year, usually during March, the Lacandones clear forest lands for their garden-sized fields. For this some still use flint axes. But more use the now antique, broad-bladed axes long cherished by many Mexican Indians. These were acquired from mahogany cutters, who invaded some of the farther edges of the lost valleys about a third of a century ago.

Having felled the forest trees and bushes, the Lacandon burns off his land. Using hoes usually made of hard woods, or, occasionally, homemade wooden plows drawn by manpower or womanpower, or a combination thereof, he loosens the newly cleared land. Like the Mayas of old, the Lacandones have no beasts of burden.

With the May rains the Lacandon plants the corn, punching shallow holes in the ground with a pointed stick, and covering the seed with his bare feet. Before planting the corn, he appeases the ancient Maya god of the maize by offering the first harvested ears from the previous year's crop, and feeding the prescribed "god pot" with appropriate kernels, and sometimes with a home-brewed liquor. The latter is called *baltche*. It is made from the bark of a native tree by that name, and is fermented with crushed corn kernels and wild honey. The resulting liquor

has a powerful alcohol content and a flavor that makes the puny white man shudder. But, like the ancient Mayas, the Lacandon drinks the brew for religious purposes only; for occasional communication with his gods. Otherwise, the Lacandon abstains from all alcohol.

Unlike those of other Mexican Indians, the garden farms of the Lacandones are more than "milpas" or midget corn fields. Rather they are miniature farms, with corn the principal crop, but with tobacco, calabashes or squashes, yucca, cotton, beans, and several varieties of edible pepper, as additional subsistence crops. Thus the children of Nature are essentially good farmers, even though they still dwell in what amounts to a continuing Stone Age.

Also, they are good housekeepers, although Lacandon housekeeping is also laborious. Grinding the corn is the most arduous and long-continued chore. This remains women's work. Using rock pestles and mortars, the latter scooped out of stone, the women and



Cigar smoke is used for a delousing operation by a Lacandon mother.

A Lacandon father teaches his son how to make arrow shafts. The bow and arrow serves these Indians only for use in their hunting.

girls labor for several hours every day "pounding" meal for the tortillas. Those, for unexplained reasons, are made square instead of round, and are appetizingly baked on heated rocks. Lacandones do not use stoves.

Lacandon women continue to spin thread on hand-turned sticks and to weave cloth on primitive wooden looms. They make pottery, particularly urns and jugs, from native clays, and entirely by hand. Frequently they decorate the pottery most attractively with local mineral pigments. Like the Maya women of old, the Lacandon women continue to shape attractive hair-braid ornaments of small and brilliant feathers, and to devise attractive necklaces and bracelets of colorful shells.

The Lacandones use tobacco only in the form of cigars. Men and women alike revel in these "stogies," which they deftly roll by hand from the homegrown tobacco leaves, which are painstakingly cured.

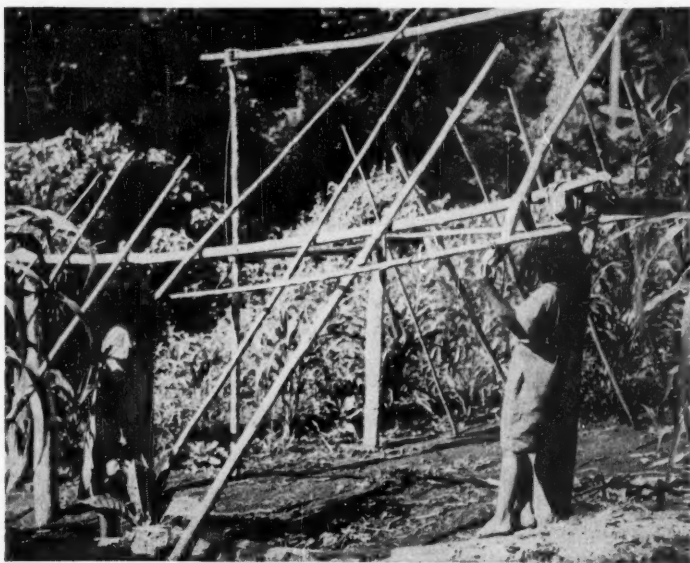
The Lacandones are intensely fond of music, but



their only indigenous instrument is a simple, four-hole flute, made of hard cane and played by blowing lightly into a side vent at the upper end. The resulting music is thin and wavery, (at least to the alien ear), but it has a free and improvised quality easily associated with the pipings of Pan. When a member of the recent Carnegie exploring party brought his violin along and played Strauss waltzes, the Lacandones listened delightedly; some of them even wept with joy.

As real and own children of Nature the Lacandones lead a good life. The average life-span is somewhere near 50 years — 12 to 15 years shorter than those now current in the United States, but at least 15 years longer than the average of Mexican Indians, and perhaps 20 years longer than those of tropical peoples at large. Cigar smoking is the one readily discernible excess in Lacandon living.

Nature is bountiful and generous, but the Lacandones are not lazy. Men, women, and children all work, and all are accustomed to four to ten



The Lacandon builds a hut in the ancient Maya fashion. The hut is simply constructed so that it may be abandoned at little loss of effort.

hours of devoted work each day. Much of this labor requires manual skill as well as strong muscles. This applies to hunting, still the most highly productive of Lacandon occupations. The forests hold many dangers, and for the most part the hunter still depends on home-made bow-and-arrow. With tough, deft fingers he continues to chip out arrowheads of flint and to set his home-whittled arrow shafts with feathers. With jaguars and other dangerous mammals plentiful, poor marksmanship can spell sudden death or painful injury, as well as loss of a meat ration.

The Lacandon hunter must be able to run fast, climb nimbly, swim well, and trail his game shrewdly. When violent floods strike, he is frequently obliged to improvise a log raft, or to chop out a log canoe, in order to cross the torrential rivers. The hazards of quicksand are formidable. To survive, the hunter must be both an artisan and a strategist. He must also be a realist. As compared with most other Indians, the Lacandon is almost wholly free of superstitions. He calmly declines to believe the "tall tales" or the fearsome fantasies so common in most of rural Mexico. Recently, a party of far-wandering chicleros, half-castes from the far Peten Territory, reported having seen monstrous, two-headed serpents in an area not far from the Lacanha Valley. A Lacandon elder listened politely while the interpreter recited the new and amazing legend. With equal politeness he demurred in Maya: "There are no such serpents. . ."

A foremost question reiterated by the new findings about the Lacandon is the old standby: Why did the Mayas die? The lives and circumstances of these survivors, or co-descendants, would seem to deny that the Mayas vanished because of disease, failing soils, or lack of rainfall. The Lacandon, as noted, are preponderantly disease free, they continue to till some of the richest of soils, and to enjoy a climate that is generally good. It is commonly accepted that the Mayas of old were a warlike people; that in much of their history they fought among themselves and against other once-great Indian nations, such as the Aztecs. The foregoing common inferences are not supported by the now known lives of the surviving Mayas. The Lacandon, own children of Nature, are completely

peaceful, and remarkably lacking in malice. They do not practice blood sacrifices. Indeed, they have even ceased killing the deceased's dog to bury it with the master. They merely make and place a wicker image of the dog at the dead man's grave.

Lacandon are among the cleanest of all peoples. Both sexes and all ages invariably bathe themselves daily, or several times a day. The decline of the Lacandon, perhaps like that of the great Mayas before them, seems most ascribable to lowered birthrate due to strict traditions and taboos that apply to the intermarriage of clans. Engagements, or technical marriages, are frequently decided while the principals are still babies, almost invariably before either is as much as ten years old.

But the Lacandon, like the great Mayas before them, are a "totemic" people, severely divided into clans or family groups. Each clan has its totem or ritualistic mascot (either a bird or mammal — crow, eagle, wild turkey, parrot, monkey, hog, jaguar, etc.) Frequently the totems are kept as household pets. Thus one sees a Lacandon child affectionately fondling a grizzly wild boar, or a well-fed monkey, or any one of dozens of species of native mammals or birds.

Members of one totem may not marry into their own clan. Divinations, as employed by the Mayas of old, direct which totem may marry which. Presumably for centuries, these rules have remained absolute, even though the clan population balances have long been upset and unworkable. Many of the clans or totems have long since died out completely, while many more were enfeebled as they became preponderantly of one sex. The Lacandon infant mortality is high by United States standards, although there is no reason to believe it is the prime cause for the declining numbers of the Lacandon. A contributing factor, of course, is man's ever stubborn inability to beget sons when or because he wants or needs sons; or daughters just because he desires daughters. The strictness of the totem or clan rules is the most potent background reason.

Even so, as priest, prophet, and as a citizen of an illustrious twilight, the Lacandon accepts and reveres isolation and the all-encompassing closeness to Nature. He is a child of Nature, and an exceptionally happy child

Eclipse of the Moon

By MABEL C. SATTERTHWAITTE

The blind Earth knew her playful child was there,
Circling about her in elusive mood.
She reached her tapered shadow finger through
The vast night spaces, seeking month by month,
Until, at last, she found and laid her hand
Upon the merry face. So, for a while,
The moon's bright laughter ceased. But soon she slipped
From under the maternal hand and ran,
Singing again, around the Mother Earth.

Wintering with Beavers

By WILLIAM J. LONG

WHAT little I know of beaver life has been learned from the beavers themselves on a few lakes and rivers of Maine, and a score or more waterways of New Brunswick, Quebec and Ontario. In these regions a typical or unbroken-family of beavers consists of the wise old parents, recently born kits numbering from one to four, and as many half-grown yearlings that have not yet mated to raise new families. Only once have I found a "colony" of wintering beavers, each family in its own lodge.

During the long, lazy, northern summer our typical beaver family wanders up or down its own river, care-free as gypsies, sleeping mostly by day, roving by night, finding everywhere an abundance of fresh bark—the beaver's "meat" — with a variety of lush water plants, which they taste, I think, only occasionally as a savor.

The conclusion that the beavers eat these extras only as "salad" or "dessert" was forced on me one summer when it was my good fortune to watch a family that came every evening to a feast I had spread for them — not all together but by twos or threes. First and boldest to break the reflected sunset splendor on the water into rippling waves were the kits, next the yearlings, last and wariest the old beavers. The main "dish" was a pile of branches freshly cut from a young poplar tree. Around it were a few branches of silver birch and alder from the nearby woods; apples, carrots and other vegetables from the camp garden; lily bulbs, spicy flagroot and peppery duckweed from a muddy bog. All this tempting variety is beaver food at times; but so long as juicy poplar bark was in sight the family had no eye or appetite for anything else.

Invariably they began with a "salad" of green leaves. An old beaver would daintily nip off one leaf at a time, leaving every tough stem in its socket, until the denuded twig bristled like a bottle brush. Meanwhile a kit was eating like a greedy child with no table

manners. Using his clever little paws like hands, he would cram his cheek with leaves and stems before passing the huge mouthful back to be ground by his molar teeth. And because beaver jaws have a double action — vertical for cutting teeth, lateral for molars — a kit gave the repeated impression of trying to bite, chew and swallow all at once. After sleeping all day he was probably hungry, and beyond doubt he liked his food.

From salad they turned to the more nourishing bark, which was peeled in the same way by every beaver, old or young. With a single nip he would cut a slender branch, thick as your thumb, and with another nip shorten it to about a foot in length. Holding this stick by a paw at each end, he would roll it back and forth between his teeth until the bark was peeled off. Not until the whole stick gleamed white as ivory in the fading light did he drop it and cut another. Judging by the amount eaten by this family at one meal, no winter food pile I have ever seen would last more than a week or two. From the fact that spring beavers are in excellent condition, as trappers testify, my inference is that they eat very little in winter, just enough to keep them healthy, and are quiescent but never "dormant" for the greater part of their time.

Here is a case in point: On a winter outing in the Ontario wilderness I found a big lodge at the outlet of an ice-bound lake, where fast-flowing water kept a deep pool from freezing. Behind the lodge stood a forest of hardwood. The beavers had built no dam, probably because their natural intelligence told them that a dam was not needed. More surprising to me, they had not gathered any food-wood. The explanation is, I think, that with plentiful food close at hand they preferred fresh bark to a water-soaked diet. Every second or third night a large beaver (never a small one, as footprints plainly told) entered the woods to cut a small birch and drag a few branches to the pool, where all telltale signs vanished. He made only one trip in



Illustrated by Jackson M. Abbott

one night, as though he knew the danger of lingering in wolf-haunted woods. And the amount of bark he brought home was hardly more than I had seen eaten by one beaver at a meal. How many mouths was he feeding? At least five, that number having been seen sunning or airing themselves on the ice beside their open pool.

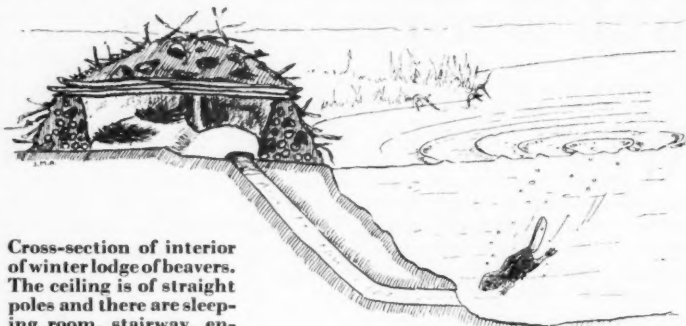
To return to our roving family, its members separated more widely as summer drew to its drowsy end. The yearlings especially came or went by themselves, reminding me of growing boys who scorn the company of "kid" brothers or sisters except at necessary meal time. But all the while they were as responsive as migrating birds to every herald of the changing year. So it happens, when shortening days are followed by chilly nights, when wild ducks are flocking and scarlet leaves flame like tiny signal fires on the maples, that every scattered family reassembles at the place selected for winter quarters. Their chief concern now should be for a food supply; but this problem is postponed for two reasons. First, before food is gathered the beavers must have a place to keep it beyond reach of frost. Second, if trees are cut too early, while sap is rising, the bark may sour in its underwater storage and become uneatable. How beavers know what to do, and in what order, is their own secret, beyond our ability to interpret.

As a help in visualizing how one family solved its winter problems of food, transport, shelter and safety, a lettered sketch of their engineering work is shown here. This was not the most difficult work I have examined, but was, indeed, almost perfect in its simplicity. R was a river, too wide for beavers to dam; the arrow point, telling how it flowed, tells also that beavers make the current help them whenever they can. H was a hill rising sharply from the river bank, its upper portion, G, being a grove of poplars that stood, unfortunately, at the foot of a slope farthest from the water. C was a canal dug by the beavers, beginning at the river and ending as near the poplars as they could get and bring the water with them. B was a brook flowing through flatlands to enter the river about a quarter-mile below the hill. D was a dam built to form the artificial pond, P, which was deep enough (seven feet in places) to protect the sunken food-wood from freezing, and wide enough to offer the beavers a little exercise by swimming under the ice. L was the lodge, built on a bank near the deepest water. From it two unseen tunnels, each barely wide enough for one beaver at a time, led down through the bank to emerge at the bottom of the pond.

These tunnels were the only entrance to the lodge,

and its only exit. One led direct to the food pile; the other was a puzzle, except upon the assumption that it enabled a large family to get out of the lodge more quickly. In a small lodge, probably built by a recently mated pair with one or two kits, I have found a single tunnel; yet of several lodges I have opened (after the beavers had abandoned them, of course,) one of the smallest had two tunnels.

Here or there in the beaver works, unmarked on our sketch, was a tunnel that began at the bottom of pond or river and slanted up to a burrow under the tree roots. These hidden dens were for refuge if the working beavers were jumped by a natural enemy, or if driven by trappers out of their lodge. To find such a den is to be reminded of an old house in my native New England. In the big chimney of this house was a



Cross-section of interior of winter lodge of beavers. The ceiling is of straight poles and there are sleeping room, stairway, entrance hall and dining room.

secret cave where children were hidden when the house was attacked by Indians led by Chief Metacom, whom the English foolishly called King Philip.

On seeing that amazing canal, winding around every wooded hillock so as to keep everywhere at the river level, one naturally asked: Why did the beavers do all that grubby work of digging soft earth and cutting tough roots when it would have been easier and quicker to drag poplar branches around the hill on a downgrade to the river? The answer was that it is beaver nature to use only waterways for travel or transportation. On land, being slow and clumsy, they are at the mercy of any hungry wolf, lynx, or wolverine; in the water they are so expert at swimming and diving that enemies have hardly the ghost of a chance to catch them. Their canal was, like their refuge burrows, another play for life and liberty; through its quiet channel they floated or pulled the food-wood, downstream to the brook and around the dam by a short portage into the storage pond. Thus at every stage, except only the dangerous tree felling, they were within a jump or two of water and safety.

With food happily gathered and stored, the only remaining work was a lodge wherein to dwell during the long months of a northern winter. The first requirement was that the lodge have no doorway through

which an enemy might break. Many woodsmen have told me, and it is frequently stated in books on natural history, that the beavers heap up a big pile of sticks, and then cut out a small room from the inside — which would be a blundering kind of work at best.

Many times I have hidden where beavers were building, and have watched from sunset through the exquisite twilight hour until darkness blotted out the landscape. Two things have impressed me at such times. One is that if only young beavers were present they acted in a slow, experimental or blundering kind of way. On the other hand, whenever a whole family were in action there was one big beaver, presumably old, who did little or nothing himself while apparently directing or "bossing" the others, and the work went on with speed and certainty. Of late years, after opening several abandoned lodges, I think that the typical but not invariable way of building is like this:

The first step is to dig a tunnel, which, starting at the bottom of the beaver pond, drives into the bank and slants upward to the lodge site. Water follows the digger to soften the earth and carry it down as mud. Young beavers, even the kits, carry quantities of mud ashore, and sometimes pat it into lumps, which harden in the frost and may be used later to weight the dome. The only way of mud-carrying I have chanced to see was to hold a double pawful against the neck, while the beaver swam by thrusts of his webbed hindfeet. On shore he would stand up with his pawful to waddle on his hind legs like a bear.

Around the upper end of the tunnel the beavers build a circular wall of sticks, stones, earth and sods, all splashed with mud that frost will harden into rocklike cement. Inside the rising wall is one large beaver whose work is, apparently, to shape and dimension the two rooms that I have found in every beaver house. One room serves as entrance hall and dining room, the other as sleeping room or elevated bench. The hall floor is hard-packed earth with a down-pitch toward the tunnel to drain off water that an entering beaver shakes from his outer coat. The floor of the sleeping room is level; on it every beaver young or old has his individual bed of dry grass or shredded bark.

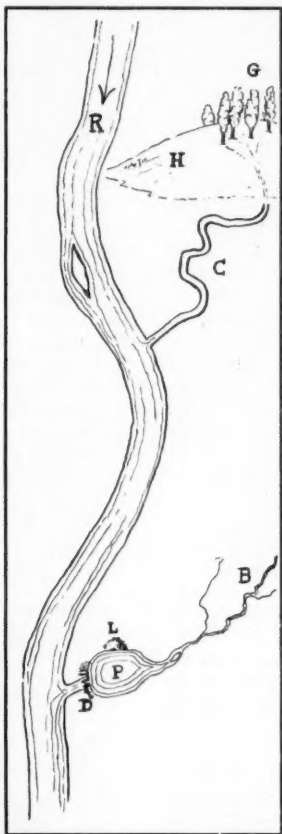
Between hall and sleeping room is a slanting "stairway" with a "rise" varying from three to six or more inches. The most nearly unique lodge I ever opened

had been built around a pine stub, about a foot in diameter, and so short that the stub was hidden under the domed roof. From the entrance hall a curving stairway led to the sleeping bench on the other side of the stub. The lodge shown in the sketch here was more typical. It had been used for the last time by two large beavers, three of half-size (probably yearlings) and one kit that was rather dwarfish, to judge by the small bed tucked away by itself. Hall and sleeping bench were roughly oval-shaped; the same ceiling covered both; a low and wide stairway led from one to the other.

The ceiling of this lodge, high enough in the hall (but not in the sleeping room) to permit a full-grown beaver to move around without bumping his head, was proof enough that the rooms had not been cut from the inside. It had been built by laying straight poles closely side by side across the whole interior from wall to wall. It was so strong after three or more years of weather-wear that I walked over it, jouncing my weight up and down, without breaking through. On this ceiling as a foundation the beavers erected a dome-shaped roof of grass, roots, rocks and miscellaneous litter, including a heavy iron cant-dog, or peavey, that some lumberman had lost in the river. Chinks in the dome and along its up-slanting sticks formed a "ventilator" through which air entered and the beavers' breath escaped. Roof and walls were so solidly built that, even in summer when the mud-cement had softened, a man needed a pick and a grub-axe to undo what the beavers had done with their paws.

The last cunning "touch" was to disguise the lodge by throwing a lot of weathered sticks over it, as some birds make their nest look like a knob of the branch on which it rests. This "camouflage" may account for the disappointment you feel on finding a lodge for the first time. You expect a rare or wonderful structure; and in summer you find a heap that looks like flotsam cast up by a flood, or in winter a white dome that looks like a snow-covered brush pile — unless, perhaps, your eye notes pugmarks telling of a hungry wolf or lynx that climbed the dome for a sniff at warm flesh just under his feet, yet hopelessly beyond reach of fangs or claws.

The winter life of a beaver family, with its short feast and long fasting, is to us largely a matter of inference. At the prompting of hunger the animals bring a few sticks into their dining hall, eat the bark, and



A sketch of typical beaver works as described in the text, showing grove of poplars, canal, dam, storage pond and lodge.

carry the peeled wood back to the pond bottom, as you may know from finding it there. After eating they exercise a while by swimming around their pond. If you cut a hole in the ice, through which to push a poplar or birch sapling — as I have done for fun, and as trappers do for profit — they will quickly find and carry it away. All the remainder of the beaver's time is spent in the lodge, resting or sleeping, or "talking" among themselves in their own way. That they are never dormant is easily proved. Thump the roof, and you hear a plop-plop, or a rumble-rumble, as the family escapes through the tunnel to a refuge burrow. It is a pleasant experience, even thrilling, when you steal up to a winter lodge and hear low voices under its snow-crusted dome. To my ear they are happy voices.

One can only imagine the beaver's wordless feeling of security on a winter night of intense cold, when trees crack like rifles, and imprisoned air roars like cannon fire under the ice, and the shiver-laden howl of a wolf pack goes searching through the startled woods. Even to such an alarm they pay no heed, as if they knew that no wolf can enter their tunnel or breach their frost-hardened walls. Or when, after hours of silent warning, a blizzard breaks loose to choke the air with whirling flakes and to bury the lodge under a drift, again the beavers' sense of well-being might be told in Whittier's word picture, in "Snowbound," of a human family by their own hearth fire:

Content to let the north wind roar

In baffled rage at pane and door.

To understand a beaver family, one must imaginatively live in a beaver's skin. Even a pioneer human family might feel well content with a weather-proof house, a

warm bed, food in the cellar, and no enemy to trouble or make them afraid.

After long months of isolation there dawns a day when a crash from up-river tells our beaver family that the ice is at last breaking up, to pile like the wreck of marble palaces along the shore. Around the lodge woodpeckers are sounding the drums of spring. Faintly from overhead comes an electric crackle, telling of wild geese northward bound. Every living creature feels the *sursam corda*, "lift up your hearts." To know how the beavers feel I need only recall the small boys of my time, who could go barefoot when they saw three swallows together. One swallow might be a mistake; but three brought the news that spring had really come, and school would soon be "out" for the endless summer vacation.

Magically now, a little open water appears in the pond, close to a bank where earth heat helps to melt the rotted ice. Eagerly to the opening comes the beaver family, to go ashore for a meal of fresh bark sweetened by rising sap. For hours after eating, the beavers sit on a stranded log, sunning themselves, "talking," combing their fur with the split claw that Nature puts on one hind toe of every beaver. With more crashing and booming the ice goes out of the river, telling the responsive family that all waterways are open and the whole lovely wilderness is theirs once more.

Next day the winter lodge stands empty, as sad looking as a deserted house. Another springtime has come, when the feeling of a beaver family might be told in Chaucer's words: "Then longen folk to goon on pilgrimages." Unlike care-burdened human folk, the beavers are happily free to go.

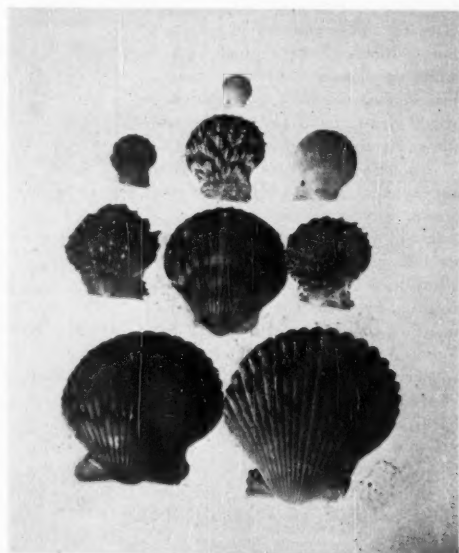
The Pecten By RUTH DUDLEY

NOT ALL sea animals are good swimmers, but the pecten is one of the best. It is a bivalve, its two shells being hinged at the top. And by clapping these two shells together it can send itself speedily through the water.

The pecten is not often caught napping, having a row of shining "eyes" along the edge of its mantle or skin. When danger is near these "eyes" ferret it out and away darts the pecten, shells furiously clapping. If it senses it is losing a race, the bivalve often will dive straight into the mud, clap its shells madly and stir up such a murky mess as completely to confound its enemy.

When the pecten wish to rest or ride out a storm it will tie itself down, doing so by sticking out a "finger" through a little notch under its left "ear" and spinning a few threads. Later, when it awakes, or the storm has passed, this bivalve unties itself and darts off again for more swimming.

The pecten has a beautiful shell, brightly colored in various shades — dark red, light orange, yellow, reddish-brown, pink and white. Some are as much as six inches across, while others are no larger than a dime. During the Middle Ages, crusaders wore these pecten shells proud-



ly, as badges, to show they had been to the Holy Land.

Doe Run Discovered

By TOM WALLACE

DESPITE all that development has done to natural scenes, there is, in every State, much that is worth the journey, and often the journey is short.

I had driven 1500 miles, in five States, along rushing mountain rivers, down into and up out of fertile and famous valleys, up to doors of noted hotels, into and out of the national capital, when it occurred to me that I had never seen a stream that traverses a wooded area less than two hours from my doorstep, and which had been described to me enthusiastically by devotees of woods and waters.

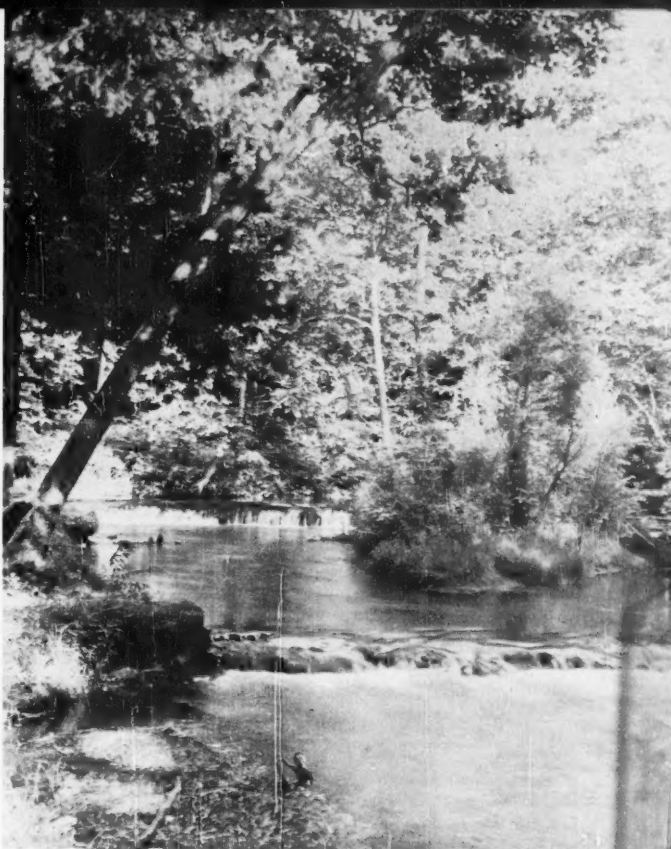
The stream—Doe Run, Meade County, Kentucky—I knew, vaguely, flowed by a rural hotel or inn at which comfortable lodging and good meals were offered, but I had no picture of the stream or its surroundings in my mind, although I had heard of both for thirty years or more. I decided to neglect no longer what seemed an opportunity for an agreeable adventure. That evening I dined on a verandah overlooking a miniature island in a miniature river. Below the island rapids — locally “riffles” — chortled. Above the island gleamed the silver of a shore-to-shore waterfall only two or three feet high but powerfully impelled.

The hotel was, in 1821 and for a long time after 1821, a mill. It has three stories, built of local stone. It stands in a fairy-story valley hardly a mile from the savage roar of the traffic of a transcontinental highway, a road connecting Los Angeles with Norfolk.

Under the influence of the scene it is easy to imagine that you are in the Cevennes and that Doe Run is an affluent of the Loire or the Rhone; or that you are in the Carpathians, and that somewhere beyond the immediate hills the peak of Gerlsdorfspitze stands out against the blue sky.

The outer walls of the inn are only two and a half feet thick, but a division wall, believe it or not, the one through which the indoor dining room is entered, is five feet thick!

Relics of the mill-days of the building are here and there in the living room. I avoid the term “lobby” as being unsuitable to an establishment over which preside a host and hostess who are people agreeable to meet; people who entertain their guests, speaking liter-



Doe Run, at Brandenburg, Kentucky, a stream that boasts myriad charms despite its proximity to civilization. Its beauty is now threatened by “development” at its mouth.

ally, before the log fire when winter winds howl and growl about the angles of the antique building and the thickness of its walls is reassuring, and in summer when insulation is provided by stone and mortar used lavishly by builders whose workmen were slaves and whose wilderness was rich in materials.

A striking feature of the inn consists of beams that inspire respect for the workmen whose broadaxes illustrated hewing to the line; beams twelve inches square, seasoned to flinty hardness by the passing of more than a century.

There is, for lodgers, a choice between the soft gurgling of a spring “branch,” which flows down a hillside on one side of the inn, and the loud brawling of the rapids on the other side. Regardless of what room one occupies, the explosions of an automobile engine started by a guest whose schedule requires early-morning departure seem distant and are reminders of the turmoil of the times, rather than an irritant, because they are filtered through so great a mass of masonry.

Doe Run, locally called a creek, would be a full blown river in France, not merely a *petite riviere*. Less than two miles from the inn it is an underground stream

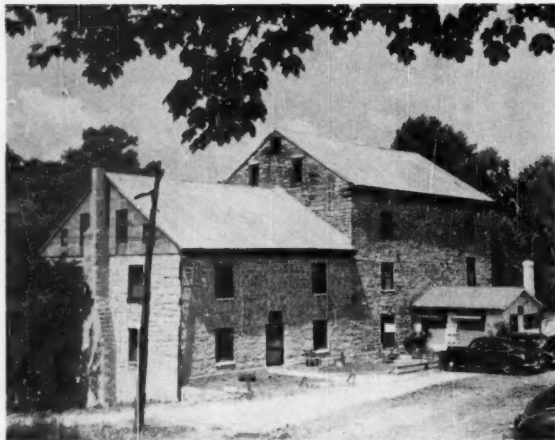
larger than Echo River upon which visitors to Mammoth Cave go in boats.

Within five miles in the other direction, Doe Run flows into the Ohio, a lordly stream more than 700 miles long, beautiful and historic. Like the river in "Kubla Khan," Doe Run comes from "caverns measureless to man." Its course above ground is so short that it crosses no highway. Its earth-level source, the point of emergence from the subterranean wanderings, is north of the highway that is nearest the Ohio. Its dancing is done, its laughter is heard, within a space so small that it might be hoped that it would be allowed that space forever, because of its singular loveliness. But an industry, I am told, has bought 2000 acres of land along the Ohio's south shore. The tract includes the mouth of Doe Run!

Possibly — I do not know the industry's plans, its bent or its requirements — Doe Run will be dammed. If so, narrow strips of meadow along its banks — meadows starred with millions of white clover blossoms when I saw them — will be forever under water. Cattle grazing on lean hills will miss their rich pasture.

Upstream from the inn there is a milldam built of huge blocks of hand-worked stone. For 100 years it diverted water to the mill race that turned the wheels — not "wheel" because the mill processed cotton as well as corn — of the mill. A few people, guests of the inn, fish above the milldam, which makes a waterfall some eight feet high, broader than and as beautiful as the famed Falls of Avon under the windows of Warwick Castle. Branches of wide-spreading forest trees, perhaps primeval, hang low, over the water. Late on a summer afternoon blue mist rises from the stream. The temperature of the water, summer and winter, is fifty-four degrees where it flows from underground. Its purity is suggested by feathery under-water plants, waving plumes of green in the riffles.

I walked down stream from the inn and, within less than a mile, I discovered another antique milldam, wider than the one above the inn and much higher; a dam that makes a waterfall fifteen or twenty feet high. The mill below that dam was built of wood and was not of great proportions. It is occupied now as a farm tenant house. The water supply of the household is from a two-inch iron pipe, without a spigot or any sort of stop. One end of the pipe is behind the dam. The other end is near the residence, twenty feet above



Doe Run Springs Hotel is well over a century old and once was a mill that processed corn and cotton.

ground. Shortage of water is not among the problems of dwellers in the old wooden mill. Nor are bills for metered water. And if they value picturesqueness of scene they are passing rich compared with members of most households. The thunder of the fall drowns voices of those who stand below the dam uttering exclamations of appraisal. The face of the cataract is a regular pattern of spurting silver. As I recall the scene there is a little more white water in the tumbling stream under the sacred bridge at Nikko than there is in Doe Run's rapids at the island, and the hills at Nikko may be, or must be, higher than those above the inn at Doe Run.

The simple antique stone mill at Doe Run does not suggest the Nikko temples. But who remembers the architectural style of Warwick Castle as long as he remembers the Avon? Whose memory of outlines of the Generalife is clear cut ten years after he visited Granada? But who does not remember always the sparkling water that races down the troughed balustrade of the Generalife?

If development overtakes Doe Run I shall be among the mourners, possibly chief mourner. And yet, for thirty or forty years I neglected seeing it. And many a lazy-legs who dines on the verandah above the rapids never sees the upstream waterfall or the downstream waterfall, and the reaches of the river between them, saying nothing of missing the "source" of Doe Run



Heaven's Casement

By MAYBELLE TAYLOR

Two filmy clouds as high as high
Frame a window in cosmic space;

Between them peers a bright star face,
'Twixt criss-cross curtains in the sky.

Dr. Willis Whitney — Truth and Turtles

By VIRGINIA VEEDER WESTERVELT

DR. WILLIS WHITNEY, although a chemist by profession, is a naturalist by inclination. A visitor to his garden notices first the tiny spires of numerous chapel-shaped wren houses, and is welcomed by the hospitable trilling of the home owners.

If the visitor happens to have a nine-year-old boy along, Dr. Whitney is likely to lead the way down some vine-bordered steps and along a well-traveled path in the underbrush to a small stream. There he scatters a few pieces of toast on the surface of the water and steps back to watch the boy's eyes widen as half a dozen yard-long carp slice into the pool, filling it like locomotives in a roundhouse.

Or the visitor may wander past the enclosure where turtles are kept temporarily for observation, and notice a poison ivy growth that has been treated in three different sections. The scientist whose pioneer work in developing the artificial fever machine brought him the award of a Chevalier of the Legion of Honor, has been experimenting with a poison ivy cure.

It would be difficult to mention a bird or a mammal, a plant or a molecule that has failed to interest Dr. Whitney. With child-like curiosity, he is always eager to learn something new, something more.

It was, of course, this "incurable inquisitiveness" that led to his important discoveries about the laws of colloids, suspensions and emulsions when he was at Massachusetts Institute of Technology, and the University of Leipzig. It was Dr. Whitney's invention of the metalized carbon filament that made the first major improvement on Edison's incandescent lamp.

Yet, at the same time, his enthusiasm for "backyard science" never diminished, and the number of his hobbies grew — turtles, first on the list and continuing foremost in his interest; snow-fleas; goldenrod galls; wrens; carp, which dates back to a small one inadvertently included with some goldfish; artificial breeding of goldfish; ant-lions; ferns; heredity; yeast; enzymes. The list is limitless, for Dr. Whitney, like his turtle friends, is always sticking his neck out in a new direction, and inspiring others to do the same, for his enthusiasms are as infectious as a grin.

"What's interesting about a turtle?" I challenged skeptically. And I found that it was in 1912 when a land turtle, making its slow way across the driveway, became Number One of the nearly 500 turtles in Dr. Whitney's notebook devoted exclusively to these animals.



Dr. Willis Whitney goes into the matter of turtles with a neighborhood boy, perhaps telling him some of the many truths he has learned about turtles.

"I didn't know very much about turtles then," he said. "But I thought it would be fun to see how much it weighed. Then I scratched my name and the date on its back and let it go. And the next year, at almost the same time, and in the very same driveway, there was that same turtle again."

This time, Dr. Whitney counted its age rings, recorded the weight again, marked the new date on its shell, and released it. He has been doing this, now, for nearly forty years, paying the neighborhood boys twenty-five cents for every turtle they bring in to him. Some turtles, like old friends, have been back to call a dozen times or more.

"A turtle is somewhat like a woman, you know," Dr. Whitney said with a smile. "You can pretty well tell how old she is, and maybe how much she weighs, up to the age of twenty-five. After that, you can only guess."

"I should think those rings on a turtle's shell would be a dead giveaway," I protested.

"Turtles don't keep on getting those tell-tale rings like a tree does, after they're twenty-five," he answered. "But they live to be sixty-five to a hundred years old. They're the most interesting slow-pokes; they've taught me a lot."

This came from the Founder of the "House of Magic," holder of seven degrees and eleven medals for his dis-

tinguished contributions to fields of scientific research!

Dr. Whitney's influence was widely acknowledged for more than thirty years, when he was Director of the General Electric Research Laboratory (The House of Magic) in Schenectady. The growing number of scientists in the laboratory were continually inspired by Dr. Whitney's ideas for industrial research. Charles Steinmetz was a colleague, and two of his younger associates were Dr. William D. Coolidge and Dr. Irving Langmuir. All achieved distinguished success for their contributions to science and humanity.

But while Dr. Whitney enjoyed thoroughly his active years in the Research Laboratory, his "retirement" (and the quotes are necessary) has been equally satisfying. It was in 1932 that he stepped away from the Directorship, which Dr. Coolidge then assumed. But Dr. Whitney has never forsaken the Laboratory. He likes to go down and watch "the boys" to see how they are coming along, and he is always welcomed with affection.

He is a frequent visitor at The Knolls, G. E.'s Atomic Research Laboratory. He once made a suggestion to a young scientist there; an idea dated back to something he learned with his first microscope, when he was twelve years old.

With this first microscope, young Willis Whitney saw some desmids — tiny, fresh-water algae — and was impressed by them. Years later, at The Knolls, there was an electron microscope exhibit that was not as graphic as it might have been. Since the electron microscope magnifies 50,000 times, very tiny things are necessary for experiment. And since the work must be done in a vacuum, living plants or animals cannot be used.

"So I suggested," Dr. Whitney related, "that he get some desmid shells. He didn't know what I meant, but I told him about my microscope when I was twelve, and that a desmid was a unicellular thing that might work out nicely with an electron microscope. And, by golly, the next time I was out there, if he didn't have a whole bottleful of desmids. It was very gratifying. And I never would have thought of a desmid if I hadn't seen one when I was twelve. I remembered it all these seventy years."

At eighty-two, he says, "I love having time to read. I read everything I want to. It's wonderful to have time to do some of the things you've always wanted to. Of course I did a lot of them when I was working, too. But now I can do as I please. And think as I please."

His agile, thinking mind is quick to leap from one subject to another. He makes notes to himself of the

things he wants to do someday, as well as small truths he has just discovered for himself. He said once that he just wanted to find out as much as he could. It did not bother him that he would never know everything; it was fun to find out as much as possible of the truth. For that is what science is trying to do, he said; to put little pieces of information together and find out more about the world.

One thing Dr. Whitney would like to do, when he has time, is to get together all his information about turtles. It would be the story of human inquisitiveness and activity, of apparently useless information turned slowly into interesting truths; of one man's application of the laws of research to a commonplace subject.

Or is there such a condition as "commonplace?" Dr. Whitney would say — no. The way a turtle lays her eggs is fascinating to him. How does she know when the sand is neither too wet nor too dry to excavate the hole in which her eggs are deposited? How can she cover them so cleverly that the human eye cannot detect their place?

Broken egg shells on the surface of the sand hills, Dr. Whitney found, were not a sign that the turtles had hatched out, but that a skunk had found the eggs and eaten them soon after they were laid in June. For when the eggs do hatch in the fall, the shell remains underground, and

the only evidence of the turtles' "coming-out party" is a narrow, elliptical hole. The eggs are hatched by the sunlight, 70 to 100 days after they are laid, and the little turtles immediately start downhill toward a stream.

In the spring they come up to the woods. They like to eat wintergreen berries. And the turtles Dr. Whitney has kept under observation, including those in his "maternity hospital" sand-hill, enjoy eating bananas. It takes a turtle about a half hour to eat half of a banana.

Dr. Whitney would be the first to say that this is not a profound scientific truth. Yet the principles are the same in all scientific research, in all our questioning about this world we live in: Why does this thing act as it does? What would happen if . . . ? What truths can I discover that might lead to other truths?

Man has much to learn. As Dr. Whitney said, a little whimsically, "I wonder which is wiser, the turtle or man. One works hard all winter to keep himself fed and warm. The other forgets it all, hibernates, loses two ounces, and arrives on the spring scenery with restful complaisance and perhaps thanksgiving; and he at least lives to a very great age and has as many summertimes as the wisest man. Perhaps he doesn't



In his garden Dr. Whitney takes one of his turtles for a stroll, giving him a chance to test various dietary items.

have the fun, though, and certainly never has the varied experiences of man."

A turtle certainly could not have the varied experience of a man like Dr. Willis Whitney. The average man, out for a walk with his wife in the early spring, who saw some black insects hopping about on the snow, might wonder idly what they were, as he walked on. Dr. Whitney began to find out.

While Mrs. Whitney counted the tiny insects in a given square, her explorer-husband paced off the area to get its approximate dimension in squares. Thus he discovered that there were millions of the insects. He took some home, made permanent microscope mounts, photographed them, and began to read all the available material on snow fleas. Was there a connection between oak galls and the eggs of insects sometimes found therein, and the snow fleas? Or do snow fleas crawl up the stems of grasses where snow has been melted by the new warmth in the spring-time sun?

And what about goldenrod galls? This plant tumor houses a grub preferred both by the goldfinch and the jay. But their methods of getting it are different. There is a little window near the head of the grub that lets light in, but which is invisible to the birds. The jay explores the gall with its beak, finds the window, and pulls out the grub; the goldfinch picks its way slowly through the wood until it reaches the grub. If neither bird finds the gall's inhabitant, it will develop into a fly, which will stay around in that same vicinity, and whose descendants will occupy nearby goldenrod stems.

These are facts about snow fleas, about goldenrod galls; facts that Dr. Whitney has found out for himself. These facts, which he has compiled from personal experience, he labels "truth." And as a scientist, even in his hobbies, he is always searching for truth.

He heard once that wrens would not nest near each other. He has discovered that this is *not* the truth. For in his spacious yard, there are sixteen of those chapel-shaped wren houses. In thirteen houses, all

within a stone's throw of each other, are wren nests.

"That, to me, is truth," said Dr. Whitney. "I might write to a German, and tell him that, and he might find the same answer — that out of sixteen wren houses, there would be thirteen nests. Then I might tell the same story to a Russian and he would only get eight wrens and would tell me I was crazy. Something else got in the way of his experiment. But for me, it was a fact that thirteen out of sixteen wren houses had wrens in them. I could see them, and nobody could convince me that it was other than the truth."

Sometimes truth is well hidden; often it is difficult to find its least common denominator. Why did the orioles' nest stay in the tree during the storm? Dr. Whitney had watched that nest being built. First the orioles flew around an old elm tree, and he thought they might build on one of its drooping branches. But one morning they began twining horsehair up and down on a partially sheared off branch of the maple tree. They snarled up that horsehair; by human standards messed it all up; criss-

crossed it until it was firm. Miraculously, the nest was safe, secure and swinging.

But, during a windstorm, half of the limb broke off; the weaker part, not the half that held the nest. Had the orioles chosen the stronger part? Was it just luck? How could those little birds test the strength of a limb? Can we ever know? Perhaps we can only guess. And supposition is not truth. But as Dr. Whitney would say, it is fun to speculate, and one never knows where it may lead.

That "fun" is waiting for all of us. Like the turtle, we can stick our necks out in every direction. We need never stop learning, if we are inquisitive. "Ye shall know the truth, and the truth shall make you free," was not an idle prediction. It is men like Dr. Whitney who teach us anew that there is truth in the world; there is order; there is law, even in the smallest things. If the greatest of these laws is truth, the greatest satisfaction is in discovering it for ourselves.

Not Likely

By GRACE STILLMAN MINCK

I wonder if the bird-held mind
Is interested in humankind?
As humankind finds interest in
Any bird and all his kin,
I wonder, from the nest on high,
If weighty conversations try
To make of man and man's strange ways
A worthy subject, phrase by phrase,
On which to ponder down his days.

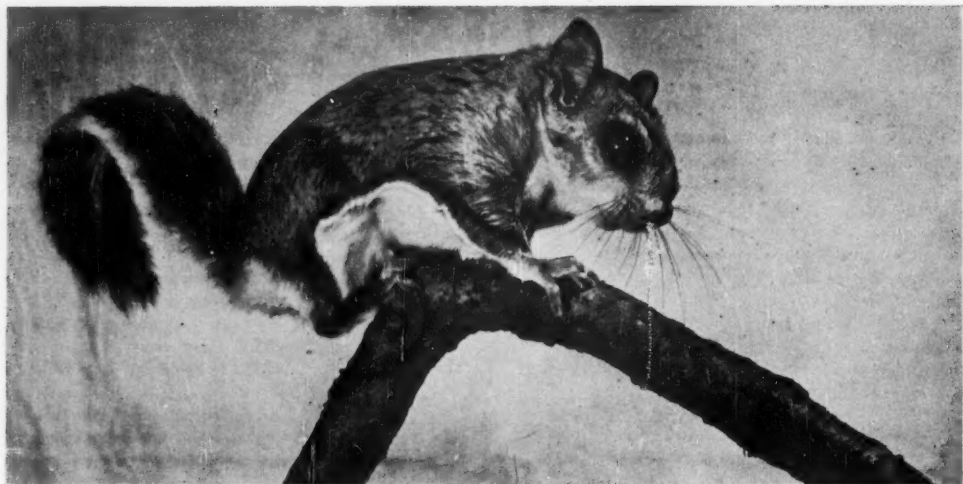


Miracle in the Grass

By ELINOR HENRY BROWN

We heard a sudden whirring sound,
A feathered mother's startled flight,
And in this cup of grass we found
What she had hidden well from sight:
A miracle close by the way
We walked, unknowing, every day.

Eleven eggs, warm from her breast!
The grass is leaning, softly blowing
Above the green and shadowed nest
Where tiny folded wings are growing. . . .
Again the miracle of birth
Renews the faith and hope of earth.



Life with A Flying Squirrel Infant

By ELIZA ROBERT

Photographs by Ernest P. Walker

BACK in Washington after a long vacation, but a little weary, we fell into bed that night in what we hopefully thought was an empty house.

In the night no ghosts or robbers walked, but in the study were small rustlings; a tiny shadow leaping up the curtains. We tried to ignore any interruptions to sleep, but the little noises persisted and a two-in-the-morning investigation disclosed, peeping entreatingly out of the little carved "window" of the magazine stand, a wee and imploring squirrel face. "He'll find his way out the way he came in," was the decision, so the light was flicked off and the door gently closed.

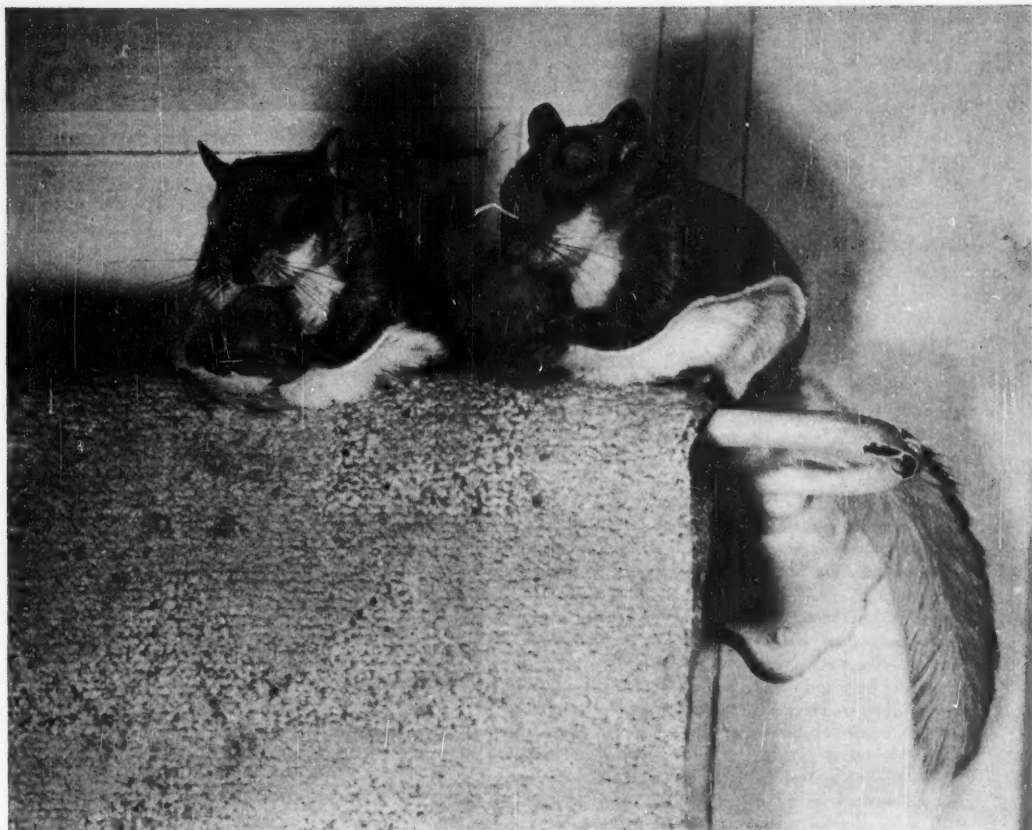
The next day the squirrel was forgotten, but that evening, when the magazine rack was moved, there he was, sitting on the edge of a copy of *The National Geographic*. Caught in a wicker basket, our guest at once curled into a tight, tiny ball, and drew the draperies of his couch about him, which, in squirrelhood, is his tail. Then it was seen to be a very special squirrel — a flying squirrel with lovely tan fluttings edged in darker brown fur down

each side, and the flattest of wide, feathery tails. It put that over its eyes in no seconds flat, so that no one could tell which end was which.

Then began the care and feeding of the waif. Experience having taught that *Holt on the Care and Feeding of Infants* was equally applicable to baby mice, half cream and half hot water over a piece of bread was offered. Put in a sea shell under what it was hoped was the furry ball's nose, the (Continued on page 106)



Dr. Ernest Walker shows the gliding membrane of the flying squirrel.



Two flying squirrels who make their home with Ernest P. Walker, assistant director of the National Zoological Park, in Washington, D.C. At the left is "Brother" and at the right is "Beautiful." Both squirrels have been provided with filberts, or hazel nuts, to open. These will help them to keep their teeth worn down.

Glimpses of Flying Squirrels

By ERNEST P. WALKER

Photographs by the Author

FLYING squirrels, are known to science as *Glaucomys volans* and *G. sabrinus*. These two species, whose ranges overlap slightly in a few places, inhabit most of timbered North America. In many sections they are plentiful, although few people ever see one. These beautiful, delicate little gliders are active only by night, have their homes and sleep during the daytime in old woodpecker holes, old bird nests, hollow limbs, or any other shelter they can find, preferably high up in a tree. Since they are nocturnal, quiet, and shy, they are seldom seen in the wild except when someone cuts down a tree with a hollow in it where several may have been living, or when they take up abode in a bird house. Scarcity of natural shelters sometimes forces the little animals to seek

homes in attics of houses, and occasionally one will get into human living quarters and be unable to find its way out. Sometimes they are seen at bird feeding shelves at night.

They are little creatures, the length of the head and body ranging from five to eight inches, and the tail is slightly shorter. The weight of the small eastern species, *G. volans*, is two to three ounces.

The gliding membrane is an extension of the skin of the body. It extends to the wrists and ankles. The tail is flat in cross section, because of the long, slightly stiff hairs on the sides that stand well out from the vertebrae, while the upper and lower sides have short hairs that lie close to the bone. The fur is soft and silky and always perfectly

groomed, if the little creatures are in good health.

When active, flying squirrels are marvels of grace, beauty and speed. The word "flying" is a misnomer for they do not fly, but glide. To start a glide they dash to a point higher than the one to which they wish to go, then leap toward their objective. Extending their front legs forward and outward, and their hind legs backward and outward, they are under way as efficient gliders. They lose some altitude and land at a lower point than the takeoff. Thus they could well be called gliding squirrels.

If obtained when young flying squirrels tame so readily that they become fascinating pets, for they are gentle, and enjoy human companionship. In a person's pocket, inside a shirt, or a lady's waist, are preferred places to cuddle and sleep.

At one time or another I have raised about a dozen baby flying squirrels. It is not difficult if one uses care and a good baby milk formula. However, a nursing white rat is an ideal foster mother for the little ones. She can devote her entire time to the project. The little ones nurse about sixty days.

Whether babies or adults, flying squirrels are the most gentle, friendly and beautiful little creatures one could wish for. However they are delicate, small, and extremely quick, so they are not entirely satisfactory as pets for children.

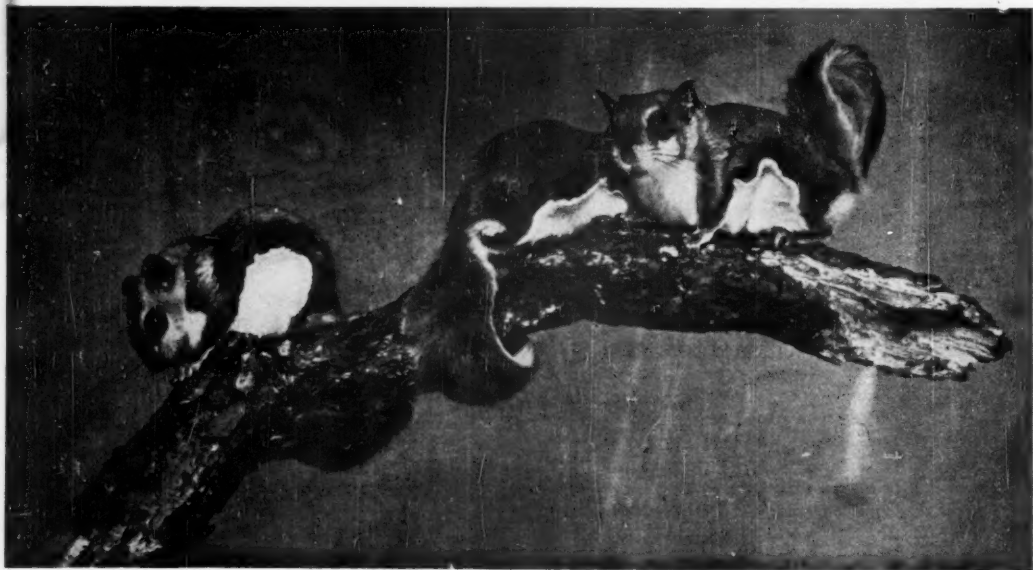
Acorns, beechnuts, hazel nuts and pecans are important foods for them, but they eat any nuts they can open. They also like grain, seeds, buds and bark of twigs, small amounts of fruits and berries, and many different kinds of insects. They are especially fond of grasshoppers, cicadas, katydids, butterflies and moths. The worms out of ears of corn are delicacies, as are the grubs that develop in acorns.

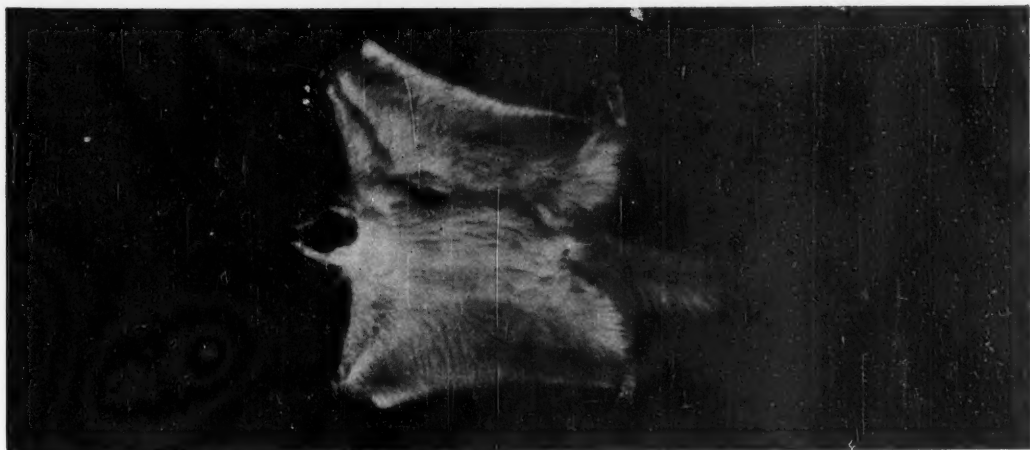
Should flying squirrels fall into your possession and you do not liberate them, try to give them the special care, including the exercise, such charming creatures deserve.



Ernest Walker holds "Beautiful" in his hand while she deftly makes a notch in a pecan so that she can more easily carry it in her teeth.

"Beautiful," who is the author's favorite, if he has one among his flying squirrels, is at the right, below, and with her are her two babies when they were fifty-six days old.

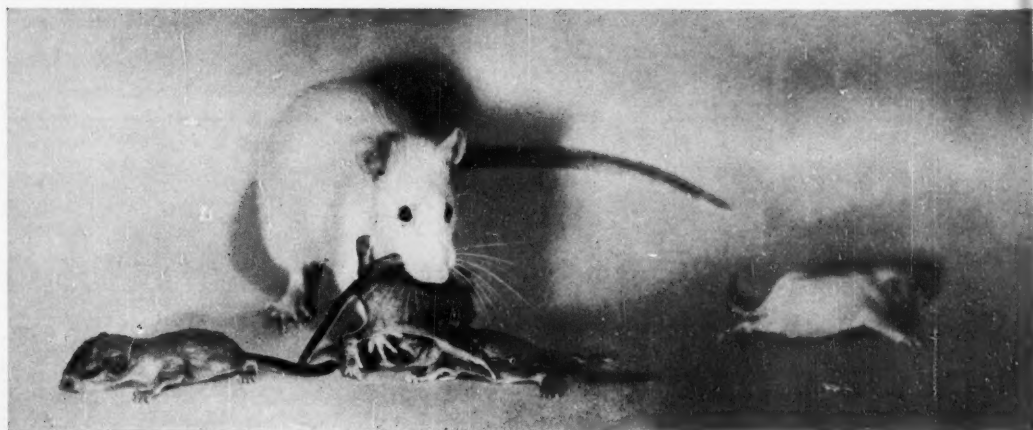




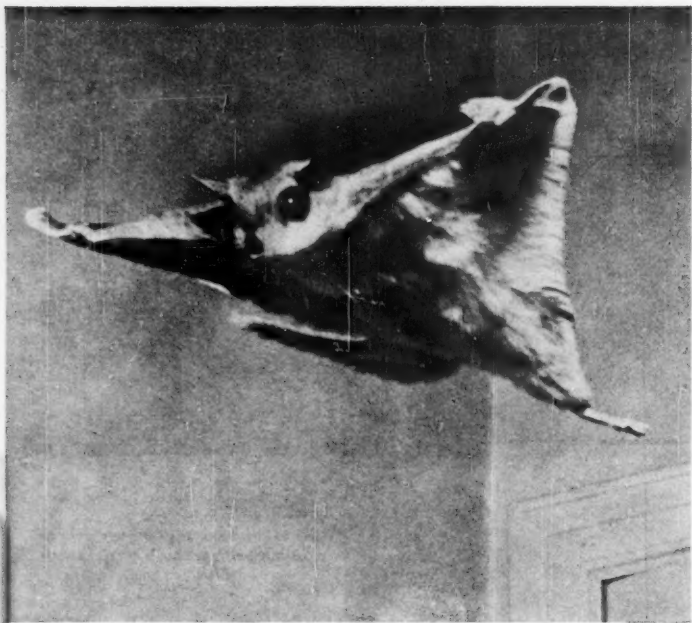
"Beautiful" carries an acorn as she glides toward the author. For this shot the camera, electronically operated by remote control, was on the floor, shooting directly upward.



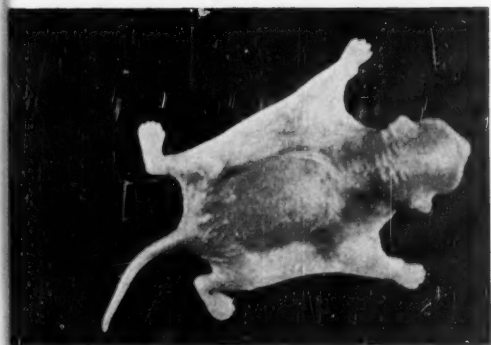
"Beautiful" takes a peep out of the author's shirt sleeve. As a matter of fact, to a flying squirrel, the inside of a shirt seemed almost as hospitable a place as a hollow tree.



A female white rat, which makes an excellent foster parent for a baby flying squirrel, carries one of three infants she is raising. Her own baby is at the right.



"Beautiful" launches on a glide toward Mr. Walker. The gliding pictures, and most of the others, were taken with an electronic flash at an exposure of about one-five thousandths of a second. He induced his pets to leap to him from atop a door or other high spot. The photographic apparatus was set up to operate by remote control that was actuated by Mr. Walker's hand.



A baby flying squirrel at the tender age of five days. This picture of the nude little animal shows well the long arms and legs and the gliding membrane.



"Beautiful" certainly has her hands full with an English walnut and appears to be puzzling as to just what she is going to do with it.



1. .(a) Phoebe. (b) Kingbird. (c) Acadian Flycatcher. (d) Crested Flycatcher.



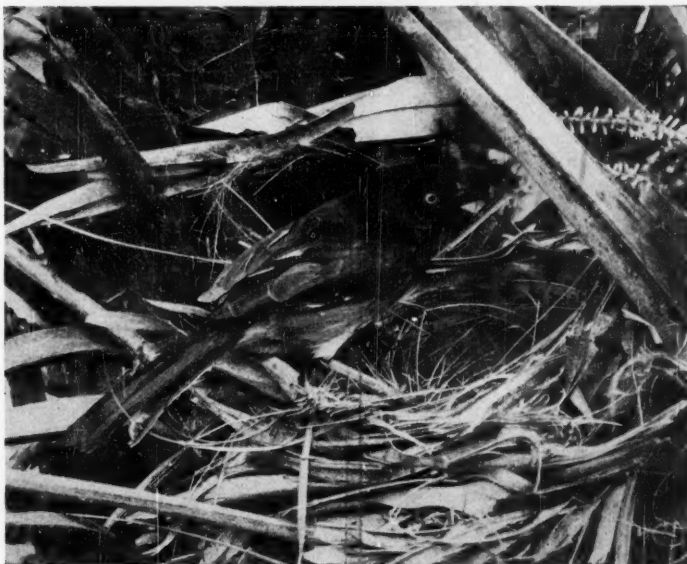
2. .(a) Short-eared Owl. (b) Long-eared Owl. (c) Screech Owl. (d) Sawwhet Owl.

Bird Photo-Quiz

By HUGO H. SCHRODER

ON THESE four pages are twelve photographs of birds, all of which are found in the southeastern States at some time of the year. Some are permanent residents; some are summer residents; others

are found in the Southeast only during the winter months. Among the twelve birds pictured these are four land birds; four water birds or birds found in wet regions; four so-called birds of prey. With each picture four names of birds are given. One of these is correct. If you can identify seven or eight, you have a fair knowledge of birds. Nine or ten correct would mark you as a good observer. Eleven correct would be excellent; twelve exceptional. See page 106 for the correct identification.

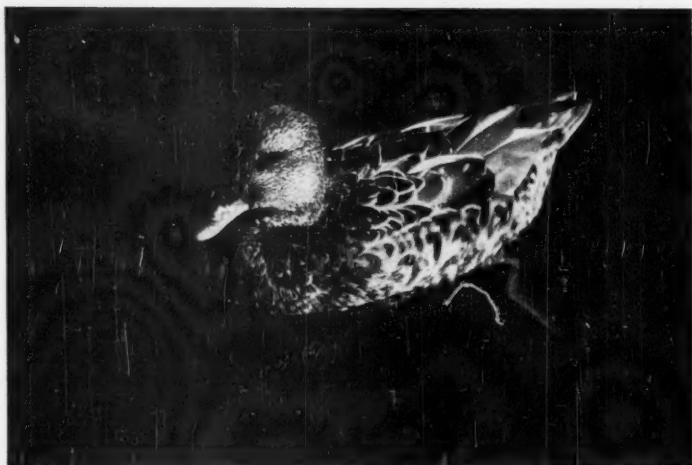


3. .(a) White-eyed Towhee. (b) Blue Grosbeak. (c) Towhee. (d) Brown Thrasher.



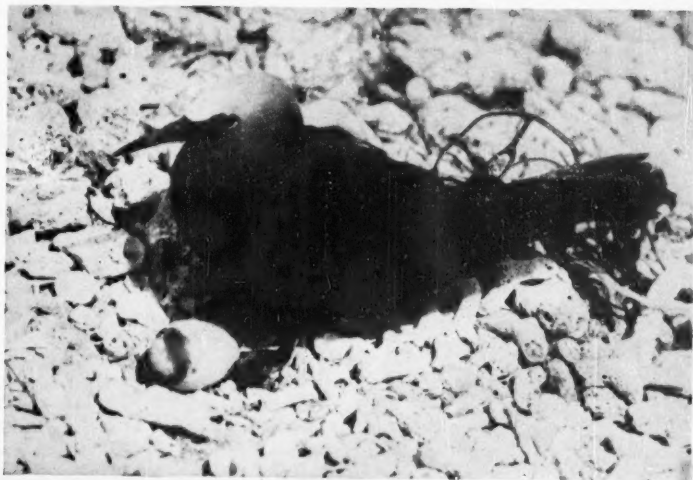
4. . (a) Sora Rail. (b) Virginia Rail. (c) Black Rail. (d) Yellow Rail.

5. . (a) Female Mallard Duck. (b) Florida Duck. (c) Baldpate Duck. (d) Female Gadwall Duck.



6. . (a) Lesser Scaup Duck. (b) Ring-necked Duck. (c) Redhead Duck. (d) Ruddy Duck.

7. . (a) Sooty Tern. (b) Black Tern. (c)
Noddy Tern. (d) Gull-billed Tern.



8. . (a) Sharp-tailed Sparrow. (b) Swamp
Sparrow. (c) Savannah Sparrow. (d)
Grasshopper Sparrow.

9. . (a) Nighthawk. (b) Whippoorwill.
(c) Chuck-will's-widow. (d) Poor-
will.

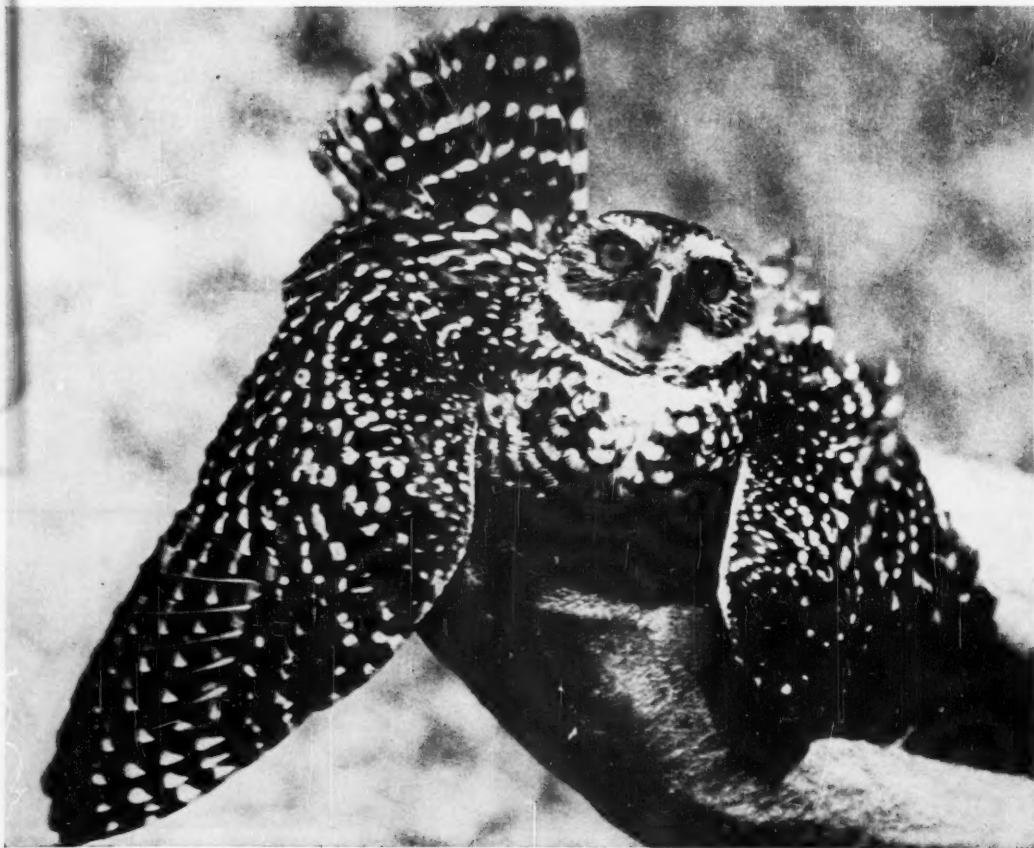




10. . (a) Red-shouldered Hawk. (b) Short-tailed Hawk.
(c) Broad-winged Hawk. (d) Audubon's Caracara.

11. . (a) Turkey Vulture. (b) Black Vulture. (c) Everglade
Kite. (d) Duck Hawk.

12. . (a) Screech Owl. (b) Florida Burrowing Owl. (c)
Barred Owl. (d) Long-eared Owl.



"Chain Reaction" Is Right!

BEARING a Seattle dateline, an Associated Press story carries, in at least one newspaper, the headline "Government to Open Olympic Park to Hunting." The headline does not, to be sure, accord with the story, but will, as is the habit of headlines, stick in the public mind longer than will the facts of the item, if, indeed, it is read at all.

The AP story says that "President Truman's order opening the Jackson Hole monument in Wyoming to hunting started a chain reaction that now may take down the hunting bars in the Olympic national park." This is, of course, badly garbled. Possibility of hunting elk — and elk only — is provided through a compromise contained in the legislation that sought to solve the so-called Jackson Hole National Monument controversy. The law, which throws Jackson Hole into Grand Teton National Park, permits strictly controlled hunting of elk within specific and restricted areas if reduction of the elk herd is necessary in the interest of the herd itself. Beyond signing the act, President Truman has nothing to do with it, and would have nothing to do with hunting in the Olympic National Park. It is up to the Congress, since existing law specifically prohibits hunting within any area under National Park Service jurisdiction.

Seizing on the Grand Teton precedent, however, the Game Commission of the State of Washington voted to ask Congress, according to the AP version, to "open the way to hunting in the park." It is not clear whether this resolution seeks hunting of all so-called game animals, or only elk. At least the commission appears to have based its plea on alleged excess of elk population in the Roosevelt Elk herd in the park. There is no real evidence that such an excess exists, and, indeed, ample evidence to the contrary.

What bothers us — and our conscience as a conservationist and defender of the national parks — is the "chain reaction" mentioned in this newspaper story. We long opposed any knuckling-under that would permit hunting of elk on Jackson Hole National Monument. Then, as the issue was steadily unresolved, a compromise proposal was put forward that was, in effect, an elk control plan through specially licensed hunters deputized as rangers by the Secretary of the Interior. They would operate on certain specified areas when reduction of the elk herd was deemed necessary. This plan was accepted with varying degrees of reluctance by most conservation groups.

Commenting on this we said, editorially: "Whatever the wording of the bill, it is still sport-shooting on a National Park Service area, as well as meat-shooting

by individuals. We think it is wrong." Then, and this is where our conscience pricks, we espoused solution of the problem as the only way out, and, perhaps, the only way to have the Monument area properly administered and the "animosities of the controversy properly interred." We also declared that "we do not regard this elk solution as precedent, and will fight to the last ditch against any application of a like device to any National Park Service area."

In this last statement we anticipated the "chain reaction" that might result; was, in fact, bound to result. The Washington Game Commission is not the only one that has set the atom of national park hunting to whirling, and we may expect more.

However much the National Park Service, and groups and individuals who are supporters and defenders of the national parks, try to convince themselves that the Jackson Hole elk problem was a special case, they are only kidding themselves. We are as guilty as the rest. By whatever name you call it, shooting elk for sport on any national park area is basically just that. It is a breaking down of a national park standard, and evasion of the law that protects the national parks and places them in a special category.

There is a disposition among those who thus concurred in the Jackson Hole solution to reassure themselves that Congress would not further let down the barrier. We are not confident of this. If this precedent is to be seized upon by individuals and agencies jealous of the game resources of the national park areas and eager for more gunning opportunities, then why would this precedent not have weight with the members of Congress?

Reaction to the Game Commission's resolution in the Olympic National Park area was not all favorable. The owner of the *Port Angeles Evening News* took a strong stand against the proposal and advocated protection of the elk in a sanctuary outside the park when the animals come down to the valleys in the winter. The sports editor of that newspaper said: "Of course it is almost beyond consideration that the matter would ever pass Congress. This park was set aside particularly as a sanctuary of primitive grandeur to protect the game and timber which lies within it. But just the fact that our own game chiefs wish to harvest it leaves one almost spellbound. What will they do next?"

There is, without question, an unexpressed yet widespread desire among organizations of hunters to see broken down the protection thrown around the national parks. The atom that can do it has been loosed, and the chain reaction has started.



Silent Servant

By ARTHUR B. MEYER

HE IS not as you. He has been a workman in the slow factory that builds your soil, purifies your air and hastens the coming of rain upon your fields and pastures. Without him and his kind, you and your kind would be as a fish in the primeval sea, or a minute organism in the desert sands. And yet you know him not.

Your measurement of time is to him as that of a gnat, and your future projects into his past as the horizon meets the sea. His breathing has the rhythm of day and night, and his hours of work are the spring and summer seasons.

He is a tree upon the land; he is a Shortleaf Pine.

* * * * *

How often does a chance remark, or a discerning glance, uncover depths of unguessed merit in an acquaintance who we have never before taken the trouble to know?

I have a friend who stands beside an Ozark gravel highway. He has been seen by thousands of travelers; he has been noticed by few. He is one of a multitude, as you are one of a multitude. And yet we learn of a strange country best by intimate knowledge of one of its citizens — not by generalities.

Observe him. He stands some sixty feet tall. He is slightly past the prime of middle age, having lived almost three-quarters of a century. All about him, coming almost to his middle, are hundreds of his prog-

eny; a prolific family and mostly of the same age.

You would understand him better if you knew some of the peculiarities of his kind; pioneers who like sun and wide open spaces, and who refuse to grow in the shade. This often results in their being eventually crowded out by the oaks and hickories, who, like city folk, are more tolerant of crowded places. So the shortleaf pines are usually found on poorer, rocky soils; sending down their roots in drier and less productive sites where competition with other and more demanding trees is less.

Significantly, however, the pines, by their very presence, improve the soil gradually, raising its moisture-holding capacity by strewing the ground with twigs, needles and fallen trunks, which rot, form humus, beget fertility. Thus the shortleaves change the character of the site; improve it until gradually the more demanding hardwood trees move in and crowd out the pine. And so, strictly speaking, the shortleaf pine, as well as others of its relatives in the pine family, are vegetative pioneers.

That a pioneer species should still be living and thriving in a land that is geologically as ancient as the Ozark Plateau would at first seem astonishing. The hardy forerunners of vegetative succession should have long since finished their task of soil building and vacated the land in the presence of advancing forests made up of more highly developed, more particular,

species such as red and black oaks, and hickories.

Actually, in the delicately balanced program of Nature, this shortleaf pine was to have been one of the last of his kind to grow on the sandstone soils of that ridge top.

When he was a youngster he stood tall as his elder associates, but slim and straight with the grace of youth. He swayed in the winds that swept over the Ozark hills like the baton of a great conductor, who leads and yet seems to accompany the music of the symphony. Around the pine danced light green legions of hardwood leaves, rippling and weaving in the wind and sun.

The relentless progression of Nature's plan had prepared the hills, clothing the granite knobs and the sandstone ridges with the irreplaceable soil that begets and nurtures life. Then the white man came in force, blazing survey lines through the timber, hacking out bottom fields for row crops, hunting deer and turkeys in the forest.

After these came the lumbermen. The big pines went first, our friend being left as too small. Then the biggest hardwoods followed in a steady stream of sawlogs and, later, railroad ties. Great gaps opened in the forest on the ridge. Sprouts from hardwood stumps shot up, force-fed from the roots of the fallen trees. The shortleaf pine stood, during his adolescence, entirely surrounded by oaks and gums, hickories and ashes. He was an orphan; a forgotten child whose family had moved on.

As he reached the proper age he began to send out seeds, twirling like helicopters on the wind. Many fell in the litter and leaves of the hardwood forest floor and died, unable to send roots into mineral soil. A few found bare spots and sprouted hopefully, but the shade of the over-story of trees and sprouts robbed them of the sun and they, too, died.

There was no need for the pine on a site that would support hardwood trees in dense array, nor was there enough sun and space. The land had been built up and the hardwood trees were there to stay.

And then a new factor came to the forest, brought by the men who followed the loggers. These were farmers who tilled the level patches of ground, and brought cattle to roam in the woods and seek such nourishment as they could find among the sprouts and trees. With them these men brought fire, which they set loose to kill the trees and convert the steep, rocky, forest soils to grass.

As the seasons marched across the hills the shortleaf

pine grew. His bark was thick and when injured by fire the wood exuded resin, pungent as the odor of an operating room antiseptic, and as effective in preventing disease and decay.

But spring became a time of death on the ridge. The soil, stripped of its protection of leaves and decaying litter, baked by the sun and washed away by the rains, became a pitiful travesty of its former self. Gradually the stand of hardwoods began to thin out. Even the hardy sprouts began to die, not so much from the annual

mortality of fire, from which they re-sprouted again and again, but because the soil became at last unable to support more than a far-spared few.

The pine seed scattered now on spots of open ground and sprouted. Yet, surely as one wet and rainy spring kept out the fire, as certainly did the next spring bring the blazes dancing with the wind, eating at the scattered leaves and twigs, scorching dead the little pine trees. Some, not too severely heated, died only in the tops and their roots sent up new shoots in whirls of warped distortion, like dwarfed and starving children. And yet they lived, for Nature had endowed this species of pine, as few others, with the ability to sprout.

The attempt to convert forest soil to the production of grass by the use of fire brought no grass. A thin stand of decrepit cull hardwoods, left by successive logging operations, stood in isolated shame among puny, hopeless sprouts, which ringed the rotting oak stumps. Goats were in-

troduced to remove the remaining trees in a further effort. This called for a fence, lest the goats be not hungry enough to clean out the trees and brush. The fence was tacked to the Shortleaf Pine and his permanent safety from the felling axe was assured.

Even the starving goats did not relish the resinous needles of the little pines, but they chewed ravenously at the hardwood sprouts and leaves, and kept every semblance of vegetative cover from the soil. There was not even enough left to allow annual burning of the woods.

The rains beat down on the naked soil and washed it away. Still the shortleaf pine sowed seeds upon the land.

Finally the quick succession of changing ownership of the ridge began to slacken. The land was too poor to be of interest, even to the most covetous speculator, and it was left idle for a time; was without goats, without fire.

And the shortleaf pine (Continued on page 106)

Morning Wind

By DANIEL SMYTHE

The shiver of wind
Is swift to take
The sound of the bird—
Robin or thrush.
It will gladly shake
The bells of their songs
Across the hush.
I will listen now
To the whispering flail
Of the branches on high,
Or a twig drawn forth
Under the sky
And played on the glass
By the wind's nail.
I will walk beneath
The tides of the air
And smile and breathe
Of their depths and more.
And beyond the tree,
And beyond my door,
I will be glad
That I am aware
Of the great wind's sea.

Edible Flowers

By ALEXANDER F. SKUTCH

IT is a brilliant morning in late November. Through the open window of my study I look out upon two trees of the *poro*, *Erythrina rubrinervia*, enjoying their generous display of bright scarlet blossoms, whose gay color is doubly welcome after many weeks of wet and gloomy weather. Seven years ago I planted these trees by setting long, straight, living branches upright in the ground. Soon they put forth roots at the buried end and a cluster of branches at the top. Now the tallest is a shapely little tree about twenty-five feet high.

In October, the height of the rainy season here in southern Costa Rica, the *poro* trees begin to shed their compound leaves, each with three ovate, pointed leaflets. Now the profusely flowering boughs are nearly leafless. They will continue to blossom during December and January, when days are bright and nights cool, set seeds, then clothe themselves with fresh foliage when the rains return in late March or April. The flowers are most peculiar, so that at first sight one would never suspect that the tree belongs to the Leguminosae or bean family. The scarlet standard, about three and one half inches long, is narrow and tightly folded. In shape it resembles a somewhat curved sword, whence the names *cuchillo* (knife) and *machetillo* (little machete) applied to these flowers in various parts of Central America, as well as the designation *palo sabre* (sabre-tree) given to the tree in Nicaragua. This long standard is enclosed at the base by a thick and fleshy, nearly cylindrical calyx somewhat more than an inch in length. The other four petals, typical of leguminous flowers, are reduced to mere scales hidden deep within the calyx; the ten long stamens and long, slender pistil are tightly enfolded in the sabre-like standard.

Not every nectar-loving creature can remove the sweet fluid from the depths of a blossom so well enclosed. Almost the only visitor to the *poro* flowers in my yard is the star-throat hummingbird, *Anthoscenus longirostris*, with a brilliant magenta gorget and a long, straight bill, which he pushes far down into the folded blossom, either for the sake of the nectar, or, as Thomas Belt suggested long ago, for the minute insects which alone can gain access to it. A single hummer takes possession of the two trees and assails all intruders of his own or other species. But sometimes when he is not looking a lovely, sylphlike, green-and-white Bar-



Flowers and fruit of the tropical *poro* tree. The flowers, fried in an egg batter, make a tasty dish said to induce somnolence.

rot's fairy hummingbird, *Heliothrix barroti*, steals up and visits the flowers. Evidently it extracts something to its taste; but just how it manages with its short, sharp bill I have not been able to discover.

The long standards of the *poro* flowers are edible; and the cook, when in a good humor, sometimes gathers a small quantity and makes a tasty dish by frying them in a batter of eggs. They are said to cause drowsiness; but I have noticed no marked somnolence after eating them, possibly because I have never consumed a great many at a single meal. The flowers are followed by long pods, slender except where swollen out by each of the seeds — "torose," the botanist would call these pods. The ripening seeds are attractive to the white-crowned parrots, *Pionus senilis*, which, especially on cloudy afternoons in March, settle in noisy flocks in the *poro* trees. Supporting themselves with one foot, they pluck and hold a pod in the other while, with thick bills, they deftly extract the seeds. Dainty in their manner of eating, they remove the embryos from the thin, white seed-coats. Although the parrots allow me to watch them through the window, like most of their tribe they are distrustful of mankind. If I go out into the yard they fly rapidly away, revealing, as they

spread their wings, beautiful deep blue patches that are invisible while they perch. The few seeds that escape the parrots and finally ripen are as big as beans, with hard, shiny, bright-red coats — as colorful as the flowers themselves.

About the four sides of the yard grows another tree with edible flowers, also a member of the bean family, *Gliricidia sepium*, called locally *madera negra* or "black-wood." The Guatemalan name, *madre de cacao* (mother of the cacao) is more attractive, and reminds us that this tree has from early times been used to shade the cacao plantations. Like the *poro*, these trees are readily propagated by pole-like branches stuck into the ground. Because of the ease with which they root, they are commonly employed as living fence-posts — a great economy in the Tropics where lifeless posts succumb in a few years to the ravages of termites and fungi. The poles must be tall enough so that the cows and horses can not reach the top and eat the leaves as rapidly as they sprout forth — as one of my neighbors learned to his cost. The pinnately compound leaves, which much resemble those of the black locust, fall at the height

of the dry season in February and March. Then the slender, naked boughs bear many long, compact racemes of delicately pink, pea-like blossoms. Although the form of the tree is quite different, when arrayed in pink blossoms, the *madre de cacao* reminds me of peach trees in early spring. The flowers are attractive to many birds, especially the dainty Barrot's fairy hummingbird, which sometimes visits the *poro* trees but comes here chiefly in March when the *madre de cacao* is in bloom. Brilliant wintering Baltimore orioles cling to the branches and probe the pink flowers with their slender bills; and the few orchard orioles I see so high above sea-level (2500 feet) seem to visit me chiefly for the sake of the flowers of the *madre de cacao*. Yet big, black bumblebees appear to be the chief pollinators. These blossoms are also edible by man, and are best when fried in a batter of egg, like the *poro* flowers. Strangely enough, the bark, leaves and seeds of the *madre de cacao* are said to be poisonous to rodents, dogs, and other animals; yet cattle eat the foliage with impunity, and men the flowers!

Still another plant with edible flowers that grows in my yard is the *itabo*, *Yucca elephantipes*. Of much slower growth than the two leguminous trees, my single example, already two or three feet high when planted seven years ago, is now only three yards in height and has not yet blossomed. When well-grown the *itabo* is about twenty feet high, with a few thick, stiff branches, each bearing at its end a generous cluster of long, sharp, bayonet-like leaves — much in the fash-

ion of the related Joshua trees of the arid Southwest of the United States. At the level of the ground the trunk is often enormously flaring or swollen, whence the specific name, elephant-foot. The big, pure white, bell-like blossoms, borne in great pyramidal panicles at the ends of the stiff branches, are picturesquely called *pichones de itabo* — nestlings of the *itabo*. When chopped fine and fried they have an agreeable flavor, with just sufficient tinge of bitterness to serve as an appetizer.

Everyone who has eaten artichokes or cauliflower has nourished himself with blossoms, although with these the surrounding tissues contribute more food than the flowers themselves — swollen, fasciated stems in the case of the cauliflower; receptacle and bracts with the artichoke, a composite flower. In the Tropics, the tender, still unopened inflorescences of palms of various species are eaten. Here again one devours the floral stems along with the flower buds. But the so-called "palm-cabbages" consist usually of the soft vegetative tissues of the growing point rather than immature flowers. Sometimes while passing through extensive forests I have stayed my hunger with

these various soft parts of palms, eaten raw. But on the whole I should be happier if palm trees were in no way edible. For trespassers are rapidly despoiling my woodland of its *palmitos*; and it seems a crime to sacrifice a stately tree, fifty feet or more in height, for as little food as a single cabbage provides. Fortunately, most of my palm trees are not *palmitos* (*Euterpe*) but *chontas* (*Iriarte*), whose towering, slender trunks are supported by stout, spiny prop-roots, which spring from the trunks two yards or more above the ground. Although edible, the "cabbage" of the *chonta* palm is bitter and not so highly esteemed as the sweet *palmito*. Not only do the blossoms of the plants growing in my yard provide occasional food for human consumption, they are even more important as nourishment for the chickens. These eat many of the fallen flowers of the *poro* and *madre de cacao*, and in addition the petals of orange blossoms, the white petals of the rose-apple tree, *Eugenia jambos*, and the small violet flowers of the *stachytarpheta*, a hedge shrub belonging to the verbena family. Among the local wild birds, I have seen several species of saltators — big, plain-colored, thick-billed members of the finch family — eat the large, succulent blossoms of legumes and other plants. In a note published in *The Wilson Bulletin* for June, 1947, Mr. Hervey Brackbill recorded that at Baltimore, Maryland, he saw English sparrows eat petals and stamens of apple, pear, and cherry blossoms, and a mockingbird devour apple blossoms. He cited a few instances of flower-eating by birds recorded by (Continued on page 108)

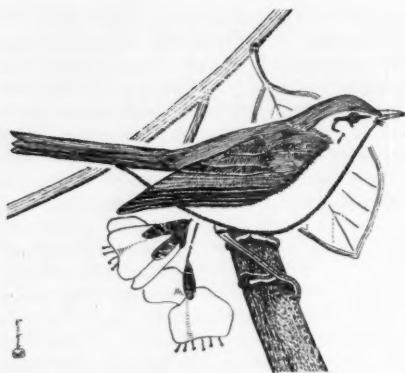
Gourmets

By JOHN NIXON, JR.

For breakfast they devoured the east
Warmed by a rosy flame —
A thin sky baked with starry yeast,
Some clouds as pink as ham.

At noon, not hungering for bread,
They dined on strips of sun
Spread picnic-wise beneath the shade
Of clims. They thought it fun.

And fun it was from eight to nine
To dip in countless jars
For evening's choicest muscadines.
Their finger bowls were stars.



The Japanese bush-warbler is a harbinger of spring, the one bird that all Japanese seem to know just as all Americans know the robin. The bird is greatly admired for its song and is a favorite of artists.

Birds of Hokkaido

By WILLIAM R. EBLEN

Illustrated by the Author

FOUR-FOOT snow drifts greeted us when Army orders moved us to the Island of Hokkaido from the mild weather of Honshu. Less than a century ago this second largest of the Japanese home islands was inhabited chiefly by a hunting tribe of Japanese aborigines called Ainus. Now it has some three million inhabitants and some flourishing cities as modern as those on the main island.

Deep snow, frigid temperatures and wild terrain limited my outdoor activities during the first month. During this period of hibernation, however, I was fortunate enough to meet, in the capital city of Sapporo, an outstanding ornithologist, Dr. Tetsuo Inukai, Professor of Zoology and Director of the Museum at the Hokkaido Imperial University. He provided me with an interesting background on the birds on the northern island. He cited many examples of the differences between the geography and animal life of the two largest islands. Although separated from each other only by the narrow Strait of Tsugaru, there are birds in Hokkaido distinct from Honshu avifauna. However, the northern island's species possess a striking similarity to those of Saghalien and the Asiatic continent. This tends to support the popular theory that there once existed a Saghalien-Hokkaido peninsula joined to the Asiatic continent, and, likewise, a connection between the other home islands and Korea.

Not content to wait until the snow melted, I emerged one day late in March from my barrack chrysalis, feeling somewhat like a precocious insect with my olive drab uniform in a contrasting white environment. I had to tramp quite a distance from camp

before I saw any birds, although the crisp winter air had carried tinkling notes to me as soon as I went outside. Even after my eyes had become accustomed to the bright reflections of the sun on the snowy landscape, I found it difficult to spot the white-headed, long-tailed titmice. Except for some black on the wings, back, and central tail-feathers the tiny mites were as white as their surroundings. The natives affectionately call the diminutive acrobat "ebisyaku"—"ladle handle"—

and nothing could describe better the appearance of this bird with its plump body and long tail.

Spring gradually revealed the country to be covered with lofty mountains, densely packed virgin forests and clear crater lakes. To me, spring meant a chance to take extensive field trips; to my roommates it meant that my small "museum" would be moved outside. This exhibit included four caged birds—a pair of Oriental bullfinches, a meadow bunting, and a willow-titmouse, all purchased in a department store in Sapporo. Although extremely interesting to me, the birds were the source of tension, for whenever I let the pets out of their cages for exercise, my buddies were always more interested in the safety of their bunks than in watching the birds feed from my hand.

It was not long before I discovered that, less than 500 yards from camp, I could be in another world; in a beautiful glen was where I spent much of my spare time. Here I found a wide range of habitats included in a relatively small area. The gradual slope into the glen was covered with a mixed deciduous growth, which provided thick cover and an added windbreak for the valley area. In this vicinity I



The white-headed, long-tailed titmouse, which the Japanese call "ladle handle."



The Japanese stonechat is clad in contrasting hues of brown and chestnut, black and white.

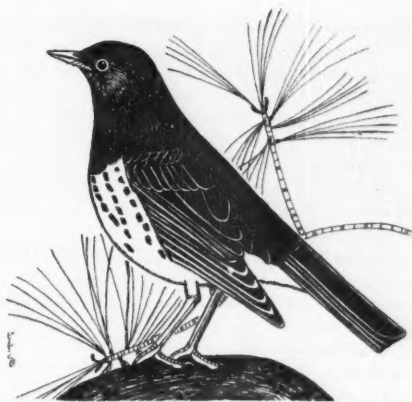
The Japanese gray thrush sang farewell to the author from deep within a thick primeval forest, its chime-like song seeming to transform the area before a small native shrine into a huge natural cathedral.

first noticed a rather inconspicuous bird with olive-gray upper parts and dusty white under parts. It perched motionless, except for an occasional jerk of its tail, in the fashion so characteristic of many flycatchers throughout the world. This modest inhabitant of the tall trees proved to be the Sumatran brown flycatcher. The same day I had a thrill when a flicker-sized bird flew suddenly into the sunlight from the top of a large tree, displaying a spectacular combination of yellow rump, olive-green upperparts, and crimson markings on the head. This *agera*, or "green woodpecker," was identical with the European species. As I tramped about this wooded area I also was continually flushing ground-feeding thrushes.

The next habitat I tackled was the orchard that bordered the deciduous woods at one end of the valley, forming a transitional area between the forest and the cultivated fields of a farmer in the vicinity. Here I found two different species of woodpeckers that reminded me immediately of our common downy and hairy woodpeckers. The larger, great-spotted woodpecker earned the name *akagera* (red woodpecker) because of its distinctive crimson abdomen and flanks. The smaller pigmy woodpecker was busily engaged in bringing up a family in one of the hollow branches of an apple tree. The Japanese wrens were constantly in this region, and proved to be dead ringers for our common winter wren.

The valley had a small stream flowing through it. This provided a marshy region, and the first day I entered the area a Japanese mallard, identical with our own, flushed into the air. Later a widgeon flew, and here, too, was a species found commonly in Europe and America. In the bushes along the stream was a feathered bundle of activity displaying a striking combination of black, orange, yellow, and white. The yellow rump and white wing patches of the magnolia warbler, and the brilliant orange throat of the Blackburnian warbler were combined on a small bird busily catching insects on the wing. The oft-repeated "pee-pilli-pee-pee" here told me many times that this narcissus flycatcher was around.

No sooner had I identified the flycatcher than a bright flash of blue shot by, disappearing as rapidly as it had appeared. When I eventually had a chance to see this Japanese blue flycatcher perched at rest, it had the blue, black, and white pattern of our familiar black-throated blue warbler, but the azure plumage on this Old World fly-



catcher was much more impressive than the blue-gray of the American warbler. The natives of Japan place this species, along with the bush warbler and the Japanese robin, among the best songbirds in the country.

Leaving the damp marshy area, I headed into a field with bushes and scattered saplings. Here I encountered a sparrow-sized bird that had me fooled completely as to its family affiliation because of its distinctive coloration. This consisted of greatly contrasting hues — brown and chestnut, black and white. The remarkable way this bird would disappear from view for a moment in pursuit of an insect, and then reappear again sitting erect as though assuming a pose, fixed the Japanese stonechat in my mind forever as a feathered harlequin. He made me realize how truly diversified the thrushes

are, and to all external appearances he seemed as much out of place in that family as the yellow-breasted chat in our New World warbler family. Another bird I saw perched nearby on a high vantage point was the oriental relative of the American loggerhead shrike. It differed only in plumage, being more colorful with a brown head and a bluish-gray back. It turned out to be the bull-headed shrike, a common species on the northern island. This foreign "butcher bird" was an excellent mimic, which explains why the characters of its name in Chinese mean "a hundred tongues."

I eventually learned that the average Japanese knows as little about native birds as does the average American. Every person in the United States knows the robin, however, so does every Japanese know and sing the praises of the Japanese bush-warbler, *uguisu*. It long has been favored as a subject by poets and artists in Japan. The analogy with



The blue flycatcher is placed among the best Japanese singers.



The narcissus flycatcher displays a striking combination of black, orange, yellow and white.

the robin is further appropriate since the bush-warbler is considered the harbinger of spring. Every Japanese I met, once he discovered my slight knowledge of the birds in his country, asked me proudly if I had yet heard the *uguisu*. Then he would imitate the characteristic spring song of the bird. I could not appreciate these accurate imitations when I first heard them in the Tokyo-Yokohama area, since, during the winter, all the bush-warbler muttered at that time of the year was an impatient "chut, chut."

One Sunday afternoon in the capital of Hokkaido, however, I heard the spring song, which was firm in my memory, and I had to admit, although I was not carried away by it as the Japanese seem to be, I was impressed by its melodious quality. Tracing the source of the "ho-hoh, hokekkyo", I soon found myself in a large public park where the Japanese children were busy gathering dandelions and weaving them into huge garlands to wear around their necks. I was about ready to learn the secret of this weaving when I sighted the source of the bird song. A pair of bush-warblers were in shrubbery along the banks of a stream, their upper parts much more olive in the sunlight than they had been when I first observed the bird on Honshu. The Japanese bird guides describe the upper portion of the bush-warbler as olive-brown; the brow, throat and central part of the abdomen all dusty-white. Most of the artists must have seen the bird in the bright light of the sun, because practically all of the portraits emphasize the olive color, which always provides a vivid contrast with the red plum blossoms that are consistently associated with the Old World warbler in paintings.

This Japanese bird favorite, which belongs in the same family with the ruby and golden-crowned kinglets, has for some time been the center of annual prize contests, with a large sum of money being awarded to the best songster. The bird lovers involved in such competitions claim that there are all kinds of strains in the song of the bush-warbler, and young birds are caught and reared in the presence of an experienced *uguisu* that has proved its expertness by winning num-

erous contests for its owner. The nobility, especially, in Japan consider the song of this bird a source of great aesthetic pleasure, much as with the famed nightingale in England.

The day before I left camp for Yokohama and the trip back home, I discovered the last Japanese bird I was able to put on my life-list. Of all the members of its family, this gray thrush will always remain vividly in my mind, not because of its simple black and white plumage, but because of its impressive song, a rather unusual combination of vigor and sweetness.

The Japanese guide's description of the vocal offering ("kyolon, kyolon, kyoo, kyoo") has little meaning to me. What still does mean a great deal is the memory of climbing a steep hill near camp that particular day at twilight and hearing the gray thrush singing from deep within the thick primeval forest of conifers. The chime-like effect of the song, reminiscent of our wood thrush, seemed to transform the small, open, shrine area where I stood into a huge natural cathedral. Before the Shinto shrine stood a small torii, or sacred archway. This unvarnished wooden structure, one of the myriad that are as much a symbol of Japan as Mount Suji, appeared before me with the ends of the top beam turned upward like arms in a religious gesture. Since the word "torii" also means "bird," it is believed by many

Japanese that the structures were originally placed before shrines so that birds could perch there and sing praises to the invisible gods within the shrine.

Two weeks later I was in Seattle, Washington. I do not think the port inspecting officer will ever forget a certain Air Force sergeant with a suspicious-looking box, completely sealed and in the top of his duffle bag with other priceless possessions. I know I will never forget the expression on his unnaturally red face when he broke the seal and discovered that the package actually did contain Japanese bird skins as I had told him in the first place. I examine these skins often, and am struck by the realization that they are such poor substitutes for the energetic creatures that made this G.I.'s duty in Japan an unforgettable experience.



The Japanese green woodpecker was identical with the European species.

Carp

By AUGUST DERLETH

Watching this carp in shallows making his way here on the morning's edge of day,
up the thin stream to lose himself in new terrain
brought under flood by heavy rain,
to go exploring there among the weeds,
to nuzzle and wallow among the reeds,
a man cannot but know how such strange places

draw alike fish and younger races.
Seeing how carp risk life and fin,
half out of water, and half in,
just to go somewhere strange,
out of their normal daily range,
makes a man know that under the skin
everything alive and moving is kin.

The Mirity Palm

By ALEX D. HAWKES

Photographs by Oelário Fonseca

THE visitor to much of northern and north-central South America will almost certainly encounter great stands of a magnificent palm that will probably be completely unfamiliar to him, unless he be a botanist specializing in this fascinating but difficult family of plants. These palms, known as the Mirity in Brazil, where they are chiefly indigenous, are among the largest of all palms, attaining a height of as much as one hundred and twenty feet under best conditions. With such trees the trunk girth often measures five feet, and it is as smooth and as straight as that of the fabled royal palm, *Roystonea regia*, and of almost the same beautiful gray-white color.

The botanist knows the Mirity as *Mauritia flexuosa*, the most important member of a relatively small group of South American palms, almost all of which attain majestic proportions, but which are incompletely known scientifically. Various vernacular names have been given this spectacular tree in its native haunts, principal among which are the variant spellings *Muriti* and *Buriti*, *Murity do brejo* (Mirity of the swamp), and *Ita*, all Brazilian names; *Eta* in British Guiana; and *Morichi* in much of the great Orinoco watershed. The palm is a native over a prodigious area in the American tropics, but is never found far from the steaming equatorial regions where it can obtain the heat and moisture it demands. Its greatest development is reached in the sultry Amazon region of northern Brazil, but great groves of it extend from the eastern Andes,



Two female, fruiting Mirity palms, showing the gigantic fruit clusters that are a spectacular characteristic of this tree.

at an elevation of some three thousand feet in Ecuador, Colombia, and Peru, to the Atlantic littoral of south-central Brazil. Immense forests of the Mirity also occur in the Amazon and Orinoco deltas, often in the saline swamps so typical of that area.

The foliage of the Mirity consists of numerous gigantic leaves, borne stiffly at the top of the trunk. In most forms the petiole, which is as much as a foot thick at the base, is from ten to twelve feet long, and the giant leaf at its apex is from nine to ten feet in diameter! The leaflets are largely rigid, except toward the end and on the midrib, where they droop sharply, giving the palm an attractive and graceful appearance.

As is the case in several palm genera, the Mirity is a dioeci-



A typical grove of Mirity palms showing how, at least superficially, these trees resemble the cabbage palmettos of our own southeastern States.

ous plant, the male flowers and fruits being produced on different specimens. The mature fruits of this particular palm are about the size of a small apple, and covered with smooth, lacquered scales that give them an appearance quite unlike anything else in the family, except for certain closely allied groups. They are rather spherical, the imbricating scales are of a beautiful, lustrous brown or reddish hue, and immediately beneath this durable outer layer lies a region of thin edible pulp. These fruits are produced, only on the female trees of course, on long, branching, usually pendulous clusters of large size. A full-grown fruit-cluster is more than a load for two husky men, since it often weighs several hundred pounds!

The fruits are made into a favorite drink by the Indians around Belem, capital of the state of Para, Brazil. They are steeped in water until fermentation commences. Then the scales and pulp around the large seed are scraped off into the liquid, which is then strained. The resultant brew is rather acid and has a peculiar flavor that is often unpleasant to the novice, but it usually becomes quite palatable as one acquires a taste for it.

A highly intoxicating, sweet wine is decocted from the sap, drawn from the robust trunk during the flowering season of the palm. The trunk also contains a sago-like flour, called *ipuruma*, that is occasionally utilized by the natives. It is said to taste like the similar cassava but is even more tasteless. Anything more tasteless than cassava can scarcely be imagined, so it is not strange that *ipuruma* is used only during times of extreme scarcity. The immense leaves are twisted when dry and the resulting fiber is used in the manufacture of hammocks and baskets. The petioles of the leaves are split, and boxes, doors, and even parts of native houses are made from them.

An interesting inhabitant of this massive palm is discussed by von Humboldt, who wrote: "In the season

of inundations these clumps of Mauritia, with their leaves in the form of a fan, have the appearance of a forest rising from the bosom of the waters. The navigator in proceeding along the channels of the Orinoco at night sees with surprise the summit of the Palm Trees illumined by large fires. These are the habitations of the Guaraons which are suspended from the trunks of the trees. These tribes hang up mats in the air which they fill with earth and kindle on a layer of moist clay the fire necessary for their household wants. They have owed their liberty and their political independence for ages to the quaking swampy soil which they pass over in time of drouth and on which they alone know how to walk in security of their solitude in the delta of the Orinoco, to their abode on the trees. The Mauritia Palm Tree, the tree of life of the missionaries, not only affords the Guaraons a safe dwelling during the rise of the Orinoco, but its shelly fruit, its farinaceous pith, its juice abounding in saccharine matter and the fibres of its leaf-stalks furnish them with food, wine, and thread proper for making cords and weaving hammocks. It is curious to observe in the lowest degree of human civilization the existence of a whole tribe depending on a single species of Palm Tree, as with those insects that feed on one and the same flower, or on one and the same part of a plant."

This Miriti was introduced into Florida many years ago by E. N. Reasoner, of Oneco, but apparently none of his plants survived. It has been introduced in succeeding years, however, and lusty specimens are now growing in the extreme southern part of the peninsula. It should be ideal for coastal plantings in the tropical parts of the State, for it seems to delight in a saline location, and bears prolonged submersion very well. Cultivated trees are encountered in most warm countries of the globe, generally grown only as ornamentals, but no economic utilization is made of them outside of the specialized uses common in their native haunts.

Enchanted Mesa

By RICHARD G. BEIDLEMAN

Enchanted Mesa, located in western New Mexico near the famed Indian sky pueblo of Acoma, is a brown sandstone butte with precipitous walls. Many years ago a severe storm destroyed the path that led from the surrounding fields to the summit town, leaving the village Indians to starve and preventing the field workers from ever returning to their homes above.

Enchanted Mesa gold against the sky.
No habitations on its rugged peak.
There were no brown-eyed children left to speak
When Spanish soldiers northward came to die.
But dwellers of the desert whisper why
The lonely butte of sandstone grew so bleak.
The pathway crumbled by a cloudburst creek

Left toilers stranded from their homes on high.
The mesa stands in desert silence now,
Its legends whispered by the southern breeze.
Gray sagebrush grows where Indians used to plough
And hides the ancient unknown obsequies.
The tourists never wonder, anyhow,
About the spirit aborigines!

Tuckahoe — A Fungus Hercules

By ROBERT SPARKS WALKER

WHEN a person thinks of a mushroom he quite naturally pictures a fungus plant that springs up in a day and night; a weakling creation. Most of the popular articles about our common mushrooms of the damp woodlands tell about their value as food. However, one such fungus possessed herculean strength and was truly a giant for power.

Long before Christopher Columbus touched the shores of the New World, the Algonquin Indians had been digging out of the ground for food, various roundish roots. These included roots of golden club and arrow-arum, and a subterranean fungus. These Indians called all these foods by the generic term Tuckahoe. The fungus was so known, and also as Indian bread, Indian loaf and Indian head. They prepared it in more than one way, and it was one of their most popular foods.

Soon after the white man arrived he, too, learned where to look for tuckahoe. Settlers became so fond of the subterranean fungus that it became an important food in the new country. Even today there are Indians and whites who still seek the fungus, despite the fact that the spread of farming lands eventually drives it out of its natural habitat. The spores of this growth must reach the underground roots of trees that are dying, or the roots of stumps left after the timber has been removed.

This popular fungus is known botanically as *Dachyma coccos*. While some assert that it prefers the roots of trees growing in sandy soil, it has been found in most kinds of earth. Some report that *Dachyma* prefers the roots of pine trees; others report finding it attached to hickory roots and various other species. Sometimes a specimen is not attached to any kind of root. In such cases it is believed that the original roots became decayed before the fungus was discovered, for experienced diggers declare that they have never found a tuckahoe that was not connected with the root of a decaying tree or stump.

The natural shape of a tuckahoe fungus is suggestive of an ostrich egg, but larger and flattened at the bottom end. The husk, or bark, is dark brown, hard and tough. The contents are white and flour-like. When freshly dug, it is moist and compact, which gives it weight. Sometimes when an Indian on finding a tuckahoe was hungry, he pitched in and ate it raw. In fact,

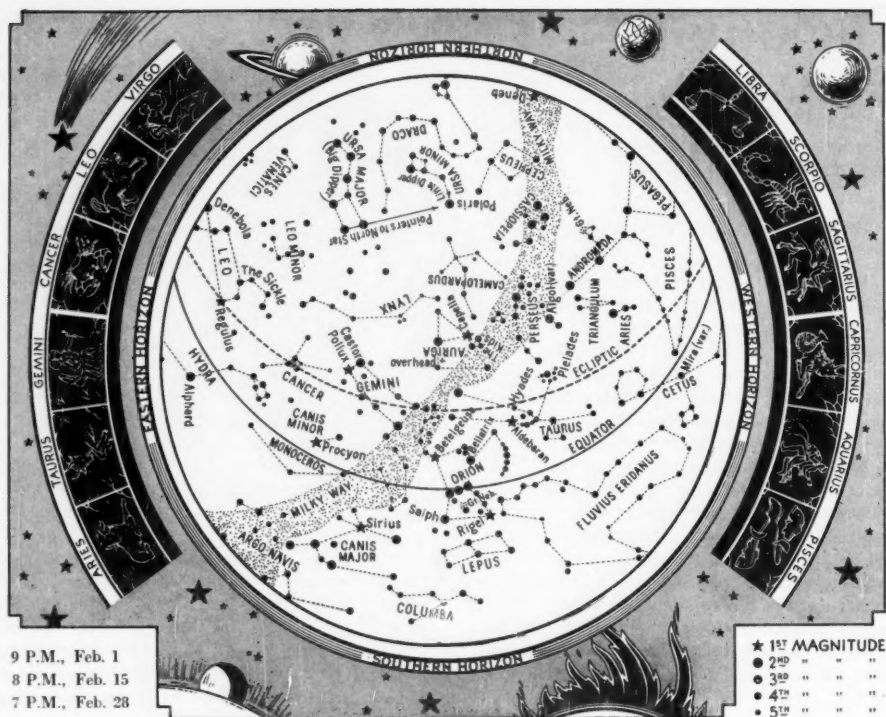


One section of the tuckahoe, a subterranean fungus, that found the strength to push up through layers of solid foundation and heavily loaded flooring. Some of the bits of crushed stone that it broke through are attached to the husk.

I have found the fungus, in the fresh or raw state, delicious and easily dipped out with a spoon. The Indians, however, preferred to roast it in the husk, and thus prepared it is a tasty food. Often, it was ground into a powder like wheat flour, and baked into bread. If the contents are left exposed to the atmosphere long enough they may become almost as hard as a rock. A specimen may weigh anywhere from three to fifty pounds. C. E. Pleas of Chipley, Florida, who has been digging and studying tuckahoe for more than half a century, tells me he discovered one that weighed one hundred pounds.

So we come to our Hercules among tuckahoe fungi. Eighteen years ago, a manufacturing plant was built in Rossville, Georgia, near the Tennessee border. The contractor first leveled off the ground and then packed a hard layer of sand and asphalt to a depth of two inches. On top of this he put a layer, four and one-half inches thick, composed of crushed rock and asphalt. This was hammered down to make it as firm as the foundation for a highway. On top of this was a two-inch sub-floor. Next, a maple floor one inch thick was nailed firmly to the sub-floor.

Steel winding machines were then fitted in the room. One day it was noted that the floor was bulging. Before long the floor at one point had been lifted four inches high. The engineer was called in and the flooring was cut out. He was expecting to find that water had somehow reached the wood and it was swelling. Instead, he found the thick layer of rock and asphalt was pushed upwards and cracked. When this tremendous weight was removed, there was (Continued on page 106)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

The Zodiacal Light

By ISABEL M. LEWIS

ON CLEAR, moonless nights in February and March, when the seeing is exceptionally fine, one should be able to see for several hours after the end of twilight the faint luminous cone of light, based on the western horizon and extending upward along the ecliptic, known as the zodiacal light. It is at this time of year that the ecliptic rises most sharply from the western horizon so that its path lies for a shorter distance than at other times of year in the dense atmospheric haze close to the horizon. It is at this time of year, also, and for the same reason, that the planet Mercury is most easily found in the evening sky.

The zodiacal light is supposed to consist of countless minute particles of cosmic dust, such as that of which telescopic meteors are composed. Or it may be that the zodiacal light is an extension of that portion of the coronal light, called the F component, which is of the

same color as the sun, reflecting sunlight, equally bright in all directions from the sun, and with a slow decrease in density outward. The globular form of this light distinguishes it from that other component of the corona, called the K component, which has equatorial streamers, rapid increase of density outward from the sun, no spectral lines, and highly polarized light. It has been suggested by some observers, and not disproved, that the zodiacal light may be a ring of particles surrounding the earth rather than the sun, and that the "Gegenschein," a luminous patch in the zodiacal light opposite to the sun, may consist of particles from the earth's atmosphere driven off by light pressure. The explanation of the Gegenschein generally accepted is that this patch of luminosity opposite the sun in the zodiacal light is composed of a swarm of cosmic particles lying somewhat less than a million miles beyond

the earth and forming a sort of dynamic whirlpool where the gravitational attractions of the earth and sun are nearly equal, one tending to make these small particles revolve directly around the sun, and the other to make them satellites of the earth.

The zodiacal light varies greatly in intensity at different seasons of the year, and also irregularly, probably because of changes in density of the particles of which it is composed. The size of these particles vary from one millimeter to a tenth of a millimeter in size.

The visibility of the zodiacal light depends greatly upon the position of the observer. It is difficult to observe in mid-latitudes because the inclination to the horizon of the ecliptic along which it lies is generally so low in these latitudes. Within the tropics, however, the zodiacal light is a conspicuous and beautiful phenomenon extending completely across the heavens from west to east, with the Gegenschein, which is about ten degrees in diameter, clearly defined. It is largely due to the fact that the ecliptic is always inclined at such a high angle to the horizon within the tropics that it is seen to such excellent advantage there. The short duration of twilight near the equator, which is also a result of the high inclination of the ecliptic to the horizon, increases the period of visibility of the zodiacal light in that region.

If one wishes to search for the zodiacal light in our mid-latitudes during February and March no attempt should be made to see it until the last trace of twilight has disappeared. The sun should be at least 20 degrees below the horizon. It appears as a wedge-shaped beam, the base lying on the horizon, the axis directed upward in the direction of Gemini. One may note from reference to the sky map the path of the ecliptic through the constellations. It will be more difficult to find the Gegenschein, which will be opposite the sun and so about as high above the eastern horizon as the sun is below the western horizon and in the ecliptic. The phase of the moon should be from about the last quarter to a day or so after the date of new moon, which would make the best time to look for the zodiacal light in the first week of February, 1951, and the last few days, running on into the early part of March.

Some successful attempts have been made to photograph the zodiacal light, in particular at the Observatory at Pic Du Midi high in the French Pyrenees. With a fast film, aperture F 1.9, and exposure of three minutes on a clear moonless night of exceptionally fine seeing, one should be able to photograph this elusive phenomenon, even without the advantage of high eleva-

tion above sea-level. Care should be taken to have the sun so far below the horizon that there is no interference from the glow of twilight. As is well-known there is a luminosity of the night sky attributable to other causes as well as to the zodiacal light, but the shape and position of the zodiacal light serves to distinguish it from other sources of luminosity of the night sky. At certain times of year it is impossible to observe the Gegenschein when the Milky Way crosses or lies close to it.

February also is one of the finest months of the year

to observe the splendors of the constellation of Orion, The Sky Warrior, because it is then so well placed in the evening sky. Most of the stars in this constellation are physically of the same type, known as the B-type or Helium stars. The stars of this type in Orion belong to a large local cluster of the Galaxy at a distance of approximately 1000 light years from the earth, and the entire region outlined by the constellation is enveloped in nebulosity, both luminous and dark, which has its greatest condensation in the Great Orion Nebula, probably the finest gaseous nebula in the heavens. It lies

in the Sword of Orion, which extends in a southerly direction from near the lowest of the three stars that form the Belt of Orion. It is visible faintly, even to the naked eye, and is a magnificent object even in a three-inch telescope.

In the heart of the Great Nebula is the star Theta, which is a sextuple star. Four of its components form the Trapezium lying in its brightest part. They are of 6, 7, 7½, and 8 magnitudes respectively. In this same region lies also the strange dark formation known as the Horsehead Nebula, which is sharply outlined against the brilliantly luminous nebulosity in the background. Rigel, the brilliant bluish-white star in the southwest corner of the huge, four-sided figure that outlines the form of the Sky Warrior is a super-giant star with a bluish companion star of seventh magnitude and intrinsically one of the most luminous stars in the heavens. It is more than ten thousand times more luminous than our own sun. Its distance from the earth is more than 500 light years.

Betelgeuze, the brilliant reddish star in the northeast corner diagonally opposite Rigel, first star to have its diameter measured by the interferometer and found to be 260,000,000 miles, might be called an interloper in the constellation of Orion, for this giant star is about 270 light years distant and of the red type M class of stars instead of the bluish-white helium type characteristic of all the true Orion stars (Continued on page 108)

Moonset

By INEZ BARCLAY KIRBY

Now with the moon declining in the west,
Her path of radiance lengthens on the sea,
A sparkling line across the water's breast
Where small waves dance in eerie revelry.

Then moon and moonlight vanish. Yet the shore
And ocean meadows still gleam faintly bright
As multitudes of stars, so pale before,
Reveal the subtler beauty of their light.

The stars, I muse, are worlds in infinite space;
Strange that a burned-out satellite near by
Can brighten earth with a more luminous face
And dim these fiery suns that tread the sky!

Camera Trails

By
EDNA HOFFMAN EVANS

REMEMBER the song that was popular several years ago called "That's What I Like About the West"? I can not quote the words exactly, but there were a couple of lines in it that went something like: "If we don't have it (thump!) then we'll get it — that's what I like about the West."

There are a lot of things I like about the West. They have been accumulating during the three years that I have spent west of the Continental Divide. I probably always will be a "dude" to the dyed-in-the-wool westerner, but at least I have pretty well lived down the other epithet, "dern Eastern visitor."

When it comes to scenic splendors, for either color or black-and-white photography, it is pretty hard to beat the West. The same holds true in some cases for plant, animal, and bird life. When it comes to character studies, be they of Indian faces, grizzled old prospectors, modern miners, farmers, or up and coming youngsters of the twentieth century, they can all be found. In fact, its very photographableness (to coin a word) is one of the things I like best about the West.

To many Easterners, the West is still a land of cowboys (Hollywood style), of six-gun toting bad men (also movie style), horses, cows, rodeos, round-ups, and ranches. They expect scenes or characters from *The Lone Ranger* and *Hopalong Cassidy* to meet them at every turn.

One of the hardest things for an eastern visitor to comprehend is the vast distance, the seemingly endless and empty expanse of country that stretches in every direction whenever one leaves the modern cities, and especially when one gets off the main highways and chief arteries of cross-country traffic. There is a lot of land outdoors out here. I never top a rise and see the road running straight to the horizon miles and miles away, but what I feel glad I am traveling by automobile and not by horse or covered wagon. I am glad, that is, when I really want to get somewhere. Sometimes I think it would have been fun to travel by covered wagon — still, considering all the modern comforts I would have to forego, I am not so sure.

Another thing I like about the West is its informality and its tendency toward hospitality. Of course, western hospitality, like southern hospitality, has its limitations. The Westerner does not offer you the shirt off his back, or invite you in for a chat and a bite to eat, any more than a Southerner does. However, there is a feeling of friendliness that exists in the West



Red did a whole series of acrobatics with his rope still in motion.

that you do not find everywhere.

But, getting back to photography and ranches, a camera fan can have a lot of fun on a ranch, even though he does not ride the range or stick around for the last round-up.

Not long ago I spent a week-end on a ranch — the Y-Lightning down near the border of Old Mexico. It is a "working ranch" — that is, it actually makes a business of cattle raising, and, in addition, it also is well equipped to accommodate visitors.

There was not a great deal of excitement — just the usual order of business that goes on at an Arizona ranch in January. There was a long morning ride to spot a few cattle, to check on a windmill, and to look at a section of fence. After lunch most of the group went off to try for a view of the buffalo herd that roams the Huachuca region.

Not being particularly interested in buffalo, I took my camera and headed for the corral. There our steeds of the morning posed obligingly at the feed rack munching languidly and taking life easy. I watched a red-headed cow hand trim a broken hoof and fit on a new horseshoe. I watched another move some steers from one corral to another. The ranch pony did tricks for me, and the chickens went about their business without so much as a glance in my direction.

But, as I long ago discovered, a camera is a good introduction almost anywhere one chooses to carry it. Before long, the red-headed cow hand had laid aside his hoof rasp and taken his rope in hand. The other was using more than necessary flourishes as he rounded up the steers. In a few more minutes there was a miniature rodeo in progress and I was photographing happily.

"I'd shore like to have a picture of me doing this," Red remarked as he twirled his rope in loops and spirals. "A fellow with a \$200 camera from California took

some pictures awhile back, but they didn't turn out very well."

"Hold it," I said, cranking up the tension to 1/1000th. "Let's see what this camera can do."

Red eyed my Graflex doubtfully. He had already cracked a joke or two about the size of it. I also think he wondered about the ability of a female photographer, even though she was dressed in faded Levis.

None-the-less, he began a real session of rope spinning. He spun it horizontally and he spun it vertically. He looped it and he spiraled it. He skipped over it and he jumped through it. He stood in the middle of the whirling circle, went down on his knees, took off his hat — did a whole series of acrobatics with his rope still in motion. From time to time I would snap a picture, pull the tab, reset the tension and get ready to shoot again. I am happy to say that the results pleased Red, and, frankly, they pleased me, too.

From a technical point of view, a shutter speed of 1/1000th might not have been necessary. However, motion was completely stopped at all but the place where the rope was moving fastest. There was enough light to permit speed, but I shot with the lens wide open. It was one of those bright but grayish days that sometimes characterize winter weather in Arizona.

After the rope-twirling session, Red did more tricks for me. So did Pete, the other cow hand. They roped a calf, and they tried a little bulldogging. Red even tried some trick riding, swinging on and off his horse at a full gallop.

Needless to say, these latter activities offered more photographic problems than did the rope-twirling, where lens speed alone was the most vital factor. In the corral it was hard to find the proper "angle." In the corral, also, at one minute I was too far away from the center of activity, and at the next I was jumping to

get out of the way. With a Graflex it is not too easy to follow the action on a groundglass. A camera with an eye-level viewer or a range finder would be better.

But, all in all, our miniature rodeo was fun. I know I enjoyed it, and so did Red and Pete. Nor do I think the cows and horses minded. It was all unplanned, informal, and spontaneous.

That is what I like about the West.



The Kodaslide Table Viewer 4X is designed to give projection-type viewing for miniature color slides.

MISCELLANEOUS MATTERS

SINCE I have become something of a color photography fan, I pay special attention to color information that comes through the mail. Eastman, for example, has announced a new color print service for the production of Kodacolor prints and enlargements, from either 35mm or bantam-sized original Kodachrome or Ansco color transparencies. According to the announcement, the transparencies must be mounted in 2 x 2-inch slides, (either glass or cardboard) having a standard 35mm. or bantam-sized aperture. In the process, a Kodacolor negative is made from the transparency, and then prints or enlargements are made from the Kodacolor negative. For each duplicate Kodacolor negative a charge of 40 cents will be made. Kodacolor prints and enlargements will be made at regular rates — the service is available through all Kodak dealers.

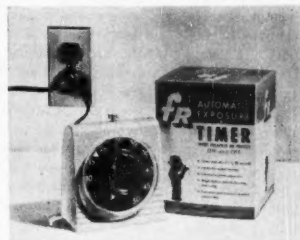
Eastman also has placed on the market the Kodaslide Table Viewer 4X, designed to give projection-type viewing for miniature color slides. Usable in daylight or under ordinary room illumination, the viewer will produce a 3½ by 5½-inch image from a 35 mm transparency or a 4½ by 6½-inch image from a bantam (828) slide. This device has some advantages over a projector and screen. However, a larger image can be obtained by means of a regular projector. The table viewer sells for \$47.50; its carrying case costs an additional \$15.



The Ideal direct-reading, photo-electric exposure meter.

Still of interest to color fans are the two new Kodak data books. They are "Kodachrome Films for Miniature and Movie Cameras" and "Kodak Flexichrome Process," the latter being an addition to the Kodak Color Handbook mentioned in January.

In the polaroid field, the latest announced accessories consist of a new filter kit designed for the Polaroid picture-a-minute cameras, a set of three close-up lenses, and a built in steel data-tape to facilitate use of the lenses. The filter set includes a yellow filter, a polaroid filter, and a "half step" filter designed for exposures between shutter numbers. The



The FR automatic exposure timer.

lens set (plus 1, plus 2, and plus 3 diopter) is intended for use in portraiture, still life, table-top photography, and in document copying.

Users of Gevaert sensitized photographic products will be interested in the company's itemized price list which covers both films and papers. For the list, write to The Gevaert Company of America, Inc., 423 West 55th Street, New York 19, N.Y.

In the exposure meter field, Federal Instrument Corp., 1402 Broadway, Long Island City 6, N. Y., offers an easy to use photo-electric light meter which they call the Ideal Direct Reading Photo Electric Exposure Meter. It is priced at \$8.95, tax included.

And finally, for the darkroom, there is (Continued on page 106)

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1951—FESTIVAL OF BRITAIN YEAR

BRITISH RAILWAYS

The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association.

LET'S STOP PASSING THE BUCK

I HAVE just finished a rather exhaustive survey of courses of study in conservation for the schools. I have also recently read an exhaustive survey of high school science programs prepared by a colleague. I have also listened to some more or less effective arguments from those who seek to find a renewed justification for science as a part of a general education program.

The conservation programs I have examined have much of a constructive nature in them. On the whole they seem to provide a splendid vehicle for a functional science program that would fit as well into the general education program as it has been outlined to me. But these modern conservation programs do calamity howl; they do emphasize loss rather than construction; they are essentially pessimistic; they do, on the whole try, to pin major responsibilities for unfortunate conditions on producers, ignoring in the meantime the responsibilities of the consumers of the products of our natural resources. We are told that the future is not bright because farmers do not use their soil properly, but we ignore placing responsibility for high costs or shortages on the processor, distributor, merchandiser or ultimate user of those products. We are told that we have water shortages in our cities because rural folk have denuded the hillsides that otherwise would delay the run-off of water, but we do little to indict the manufacturers who pollute our major streams unreasonably. We teach in our schools of the prodigal waste of non-renewable resources such as coal, gas and oil, but we are as a rule wantonly careless about how we use the heat that comes from these resources in our homes, or the power we get from them to drive our cars. Conservation is not a responsibility of any one class of persons, or of any one area of the country. It affects us all, and is a responsibility of us all.

We as adults are prone to develop a philosophy that is adult in its very essence. Children are rarely pessimists, and yet we offer them a conservation philosophy based on pessimism, and then wonder why they do not welcome it. Why would it not be better to capitalize on the optimism of youth and offer a program of construction designed to increase the depth of our topsoil, to increase our forests, our wildlife, our water supply and so on? I have attended many conservation meetings led by well-to-do women well-adorned with expensive furs, and have heard them defend programs calling for protection of wildlife and maintaining of natural balances in Nature. They usually seem wholly unappreciative of the fact that their pride in adornment may have been the foundation for a very real influence in upsetting that balance.

I think it is high time that we examine our conservation programs to gear them to the groups they are designed to influence. Louis Bromfield has offered us a philosophy different in many ways from that that was given us by Paul Sears, H. H. Bennett and others, but his optimistic approach to renewing the renewable resources is still overshadowed by the assertion that we are headed for destruction, if we are to believe what we read in our school programs. Look at the average program yourself and you will find that it deplores the loss of forests, but gives little on the renewal of forest lands; it gives more information on soil loss than on soil building. In my own State of New York, I have only recently heard a conservationist deplore the reduction in numbers of large game in the State in spite of the fact that our deer herd is probably larger than it was in primitive times, and certainly larger than it was a decade ago. Let us start giving a little credit to those hard working conservationists who have

built a better world in which to live, and let's not worry so much about those unhappy souls whose idea of heaven is a happy hunting ground at home where they can kill and kill and kill. I believe that the forces of good are greater than those of evil, and that the best way to improve things is to start building. I know that many of you believe in America because of your pride in its productive capacity. Then why not in our school programs emphasize that angle of the situation.

Let us not blame the farmer until we are sure that we are doing our part to maintain a wise use of our resources. Let us not start hurling stones until we are sure about our own record. Hitler boasted that he had built the mightiest machine of destruction the world had ever known, and yet he himself was destroyed by that kind of machine. We have boasted — and I really believe with some reason — that we have helped the underdog the world around. We have rebuilt cities destroyed by others, turned destructive waterways into sources of power and of sustained prosperity. Our privately sponsored medical profession has lent its influence to building the health and wealth of unfortunate peoples the world over, and while we have been grossly maligned for some of the things we have done, I really believe we are prouder of what we have made than we are of what we may have destroyed.

I believe Americans are happy because they are builders, and I would suggest that if we wish to build a dynamic conservation program for our schools it must be more optimistic in its viewpoint than it now is. If we must put in pessimism then let us reserve that part of it for the pessimistic oldsters. If they are convinced that the world is going to pieces, and they along with it, then let them go their way in happiness, but do not let them ruin the joy that characterizes the optimism of youth, or slow down the constructive possibilities of applying the energy of youth to a building program. Let us see to it that in our programs for youth we emphasize building, earning, growing, adding and constructing. If we must grow old then we can begin hoarding, saving, storing and otherwise behaving like the miserable misers we would be.

I would not wish to be interpreted as advocating that no brakes be put on youthful expenditures of energy and wealth and resources. All I want to say is that if we want to have our programs widely used we must adapt them, to some extent at least, to the temperaments of those who may be called upon to use them. For the fun of the thing, take the first school outline you find on conservation and see if it is not predominantly pessimistic in its teaching. Then talk for a few minutes with the person for whom the program is designed to see if he or she finds an equal appeal in a pessimistic and an optimistic angle. Check, also, these common programs to see how frequently they put the blame for trouble on someone other than the person to whom the program is aimed. Notice how much more popular it is to put blame on the other fellow, but reflect on how futile that may be if our purpose is to effect changes for the better in the behavior of those who look to us for some guidance.

Our population has grown in the urban centers but we still claim that our major conservation problems are with water, soil, forests and wildlife. How come we have forgotten the importance of air, its pollution, its effect on health and its management in the cities? We have written volumes on the management and control of forest fires by adults, or by government agencies, but have we done as well in training urbanites to appreciate how the management of fires may affect the demands of the city for resources developed in the rural areas. Our text books dealing with forest fires give more emphasis to the dramatic ways in which government agencies fight a few big fires than to suggesting how little private folk may so deal with little private fires that the fires may never grow up into public menaces.

I like to think that the tide is turning; that we are evolving programs suited to the needs of persons of wide interests, and fixing responsibility widely on everyone rather than always pinning it freely on the other fellow. Let us stop passing the buck and get down to some good old fashioned constructive work aimed at building, growing, adding, earning and otherwise developing wealth for all, not interpreting wealth, of course, as cash in your pocket for the next few minutes.



Camp Fire Birthday

This year Camp Fire Girls observe the forty-first anniversary of the founding of their organization and have dedicated March 11 through 17 as "Birthday Week." During the past forty years more than three million girls have enjoyed membership in this sisterhood and derived benefits from it. Dedicated to perpetuation of "the spiritual ideals of the home" and pledged "to aid in the formation of habits making for health and character," Camp Fire Girls have carried the teaching of the organization into adult life.

As is suggested in their name, Camp

Fire Girls pioneered in girls' camping and in competence in the outdoors. This led, of course, to an appreciation of natural resources and to an active interest in conservation of these resources. Their recently published "Our Land — Conservation Activities for Camp Fire Girls" is a guide to the ways in which young people may participate in conservation activities.

So, in anticipation of Birthday Week, it is a pleasure and privilege to wish the Camp Fire Girls "Happy Birthday," and many more birthdays crowning years of contribution to the American way of life and its preservation.

Maryland Gardens

From April 27 through May 9 the fourteenth annual Maryland House and Garden Pilgrimage will be held under the sponsorship of the Federated Garden Clubs of Maryland. More than 200 noted dwellings, many of which date from pre-Revolutionary times, will be open to the visitors. Advance information and reservations may be secured from The Federated Garden Clubs of Maryland, 217 Sheraton-Belvedere Hotel, Baltimore 2, Maryland.

For the Cat

Claims that the feral house cat — the domestic tabby that has gone wild as a result of abandonment or neglect — is a great menace to wild bird life intrigued the scientific mind of Leroy Korschgen of the Missouri Conservation Commission. Analyzing the stomach contents of forty-one highway-killed cats he found that these defunct felines had, at their last meals, dined on 38.1 percent mice; 25.6 percent rabbits; 9 percent cotton rats; 6.9 percent table scraps; 2.7 percent terrapins; 2.4 percent rats; 2.4 percent pigs; 1.9 percent grasshoppers; 1.8 percent un-

identified meat and 1.5 percent chicken. Some of the food, including the pig, was carrion, but there was no trace of songbirds. All of the evidence of quail came from one cat shot when it was stalking quail. Almost one-half of the total diet was rats and mice. The investigator says that this evidence is not conclusive so far as the house cat well cared-for at home is concerned, but the lack of songbird remains is surprising and the preponderance of rodent food a good mark for the cat.

Scout Conservation

During 1951 special emphasis will be given to conservation in the program of the Boy Scouts of America. The Scout Anniversary Week of February 6 to 12 will see the inauguration of the year's program. During that week scout troops will be encouraged to develop conservation exhibits or demonstrations. As the year progresses emphasis will be placed on the use of camp properties as a place for demonstration of conservation practices. The year 1951 truly promises to be Conservation Year with the Boy Scouts.

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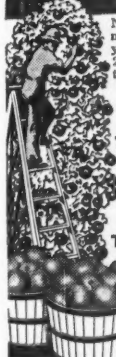


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CAMERA TRAILS

(Continued from page 103)

the FR Corporation's electric Exposure Timer. This operates in coordination with either enlarger or contact printer and automatically times prints at exposures of from one to fifty seconds. It is especially useful when a number of prints are to be made from the same negative. The maker's address is 951 Brook Avenue, New York 56, N. Y. The price is \$8.95.

"Sports Note"

"Sports Note" is the headline given to a brief editorial recently published in the *Hartford Courant* as follows:

"A Connecticut sportsman flying over a lake in New Hampshire the other day spotted a black bear sporting himself in the lake below. The sportsman glided down to his camp, grabbed a shotgun and cartridges, and blazed away at the swimming bear. Although the bear was wounded and bleeding, he didn't give up the ghost and it was only then that the sportsman discovered he was using bird-shot instead of the big-game load. Did he give up? He did not!

"The sportsman picked up a club, taxied out to the bear who was still in the water. The sportsman climbed out on a pontoon and in nearly an hour succeeded in beating the animal to death."

The editorial writer made no comment, feeling that none was necessary after the repetitious use of the word "sportsman."

Essays on Genetics

Genes, Plants and People. By C. D. Darlington and K. Mather. Philadelphia, 1950. The Blakiston Company. 187 pages.

This is a collection of essays on genetics that have been written by the two authors over a period of twenty years, during which they were both working to solve the same problems from different points of view. The articles were written individually but have a unity of purpose that makes their appearance, thus collected, most appropriate. Particularly interesting is the relationship of two of the essays to genetics in Russia, where, instead of being advanced, the study of genetics has been destroyed since the two essays involving the Soviet were written.

ANSWERS TO BIRD PHOTO-QUIZ

1. . . (d) Crested Flycatcher. 2. . . (c) Screech Owl. 3. . . (a) White-eyed Towhee. 4. . . (c) Black Rail. 5. . . (d) Female Gadwall Duck. 6. . . (b) Ring-necked Duck. 7. . . (c) Noddy Tern. 8. . . (d) Grasshopper Sparrow. 9. . . (c) Chuck-will's-widow. 10. . . (d) Audubon's Caracara. 11. . . (b) Black Vulture. 12. . . (b) Florida Burrowing Owl.

TUCKAHOE — A FUNGUS HERCULES

(Continued from page 99)

revealed a huge tuckahoe fungus. Instead of its usual oval shape, the fungus was spread out, and divided into about five sections weighing about nine pounds each. The tremendous weight above it had forced the fungus to grow flattened instead of upright.

It is easy to conceive how a seed of a forest tree may lodge in a tiny crevice, and, in course of time, its roots expand to split a huge boulder of limestone or granite, into two parts. But when a lifeless looking tuckahoe fungus, with contents like flour, musters strength sufficient to lift a heavy foundation of rock, then push up a floor made heavier by machines that weigh up to 6000 pounds each, it appears as a miracle in the vegetable world.

LIFE WITH A FLYING SQUIRREL

(Continued from page 80)

squirrel immediately uncurled, and, with whiskers twitching and huge black eyes shining, sucked at the bread as though nursing. But our guest was old enough to eat; loved dried cantaloupe seeds, rolled oats, an ear of cooked corn, on which it sat and nibbled its way along. The second day the squirrel cracked and ate a peanut, turning it in its paws and shredding the shell a tiny bit at a time. Its teeth were not very large, but flying squirrels must have hard-shelled nuts to keep them worn to the proper length. It took a long time to eat one large peanut, then a long drink of water, and back to sleep again.

We gave the visitor a home in a round Vermont butter firkin, but it still looked lost and cold, its flat tail its only shield. So the next addition to the firkin was a red lacquer finger bowl with a piece cracked out of the edge. Turned upside down, it made a perfect and decorative igloo. It was lined with cotton and a few leaves for added hominess. The little squirrel went instinctively inside, and once its little paw came out the door and fluffed and pulled a little more cotton inside.

But, and it is a big but, these cunning creatures are nocturnal. The light bothered it, and it slept all day. In the evening our guest was fun to watch and very tame. It came from its igloo to eat, scampered around the firkin, cleaned itself, and explored the rim of its world. If the squirrel was going to take its exercise at night while the family slept, it would need a room to itself, so the breakfast room was provided. In the morning we looked for "Baby" in its firkin; under its fingerbowl. No "Baby." Feverish hunting ensued. Our visitor did not seem to

be anywhere. Finally someone picked up the small radio, and there, in the opening at the back, was its little face. The squirrel sat comfortably on a tube, absolutely ungettable. It had to be lured out with fresh cream and water.

Each morning our guest had to be rediscovered; once from the vegetable drawer under the refrigerator, once from the back of the top of the curtain, and once from a metal waste basket where it was hopelessly trapped. Hither and yon, mostly yon, it hid. But the family dog was due to come home from the country kennels after his vacation, so what to do with "Baby?" One nip and the squirrel would be no more.

We called Mr. Ernest Walker of the Zoo, whose apartment is set up for house-keeping for any or all small things, from bats and squirrels to white mice. He came to call on our tiny aviator, picked him up and cupped him in his hands. Immediately the little squirrel was content, not flighty and frantic to escape as it had been in our hands, but nosing about and liking the petting, and making tentative runs up Mr. Walker's sleeve. It was an almost visible change in the little squirrel; a demonstration of confidence, trust and comfort. And Mr. Walker was conquered as well, and took "Baby" home to join a family of three others on the swings and jungle-gyms in the Walker cages.

SILENT SERVANT

(Continued from page 91)

strewed seeds upon the land, and they caught and grew. A man who knew the workings of Nature's Scheme saw the tall lone tree with its brood of youngsters and bought the ridge.

This pine was to have been the last of his kind, but man had disrupted the Scheme, so now the shortleaf's progeny stand again, profuse and velvet green upon the rocky ground. They do not measure time as you, and yet it will be long before they mend the land.

He is of that which we do not comprehend; life that lives but does not move nor make a sound. He is but one step from those inert ingredients whose varying combinations, mixed by God, make life.

Cornell Leaflet

The Cornell Rural School Leaflet, which, with September, 1950, starts the forty-fourth volume of this splendid series, is entitled "Nature Writings" and is mainly devoted to a collection of outstanding writings on Nature Study and its philosophy. Also there is a helpful contribution by Dr. Eva Gordon on choosing and using Nature and Science books for children, and a supplement to her earlier important contribution evaluating books for the elementary science library.

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EDIBLE FLOWERS

(Continued from page 93)

other observers. A cardinal ate forsythia blossoms; English sparrows ate pea and bean flowers; Galapagos finches consumed blossoms of various kinds; and, in England, plum blossoms were eaten by both the marsh-tit and the wood-pigeon.

A few animals of other kinds may eat flowers, at least occasionally. My horse sometimes devours one of the great, pink, pompom blossoms of a hibiscus bush growing in front of the house. But I have never seen him eat more than one in a day; nor does he take an interest in the almost equally big red hibiscus blossoms; nor have I seen either of the two mares eat the pink or the red variety of hibiscus. My colt seems to like the fallen flowers of the *poro*, but the other horses, so far as I have seen, do not share his taste. Dr. L. van der Pijl of Bandoeng, Java, who has made a study of those curious night-blooming flowers, which are pollinated by bats, reported that some trees of the *sapodilla* family offer their corollas as food to the fruit-eating bats, which transfer their pollen. Finally, even a reptile, the collared lizard, may depend in part upon flowers as food, as recorded by Mr. Harlow in *Nature Magazine* for January, 1949.

All told, anthophagy or flower-eating does not appear to be a widespread or common habit in any group of animals, but is perhaps most important to chickens and other gallinaceous birds. There are two reasons why I should not expect flowers to be popular as food. It would be wasteful for the plant to store starch or other substances of high nutrient value in parts that, in general, are dropped a few days, often a few hours, after opening; thus the need to economize material would act against flowers' becoming valuable as food. And if petals were made appetizing to birds or other creatures, they might be gobbled up even before they had served their function of advertising the presence of nectar or other substances that draw the pollinators. If flowers were highly edible, animals might have fewer fruits to eat. But the fact that, without having made an effort in this direction, I have now in my yard three plants whose blossoms serve as human food, suggests that in aggregate the world must contain a great many edible flowers.

THE ZODIACAL LIGHT

(Continued from page 101)

physically associated in the great Orion cluster. The name Betelgeuze, which has many different spellings, is Arabic and means Arm-pit. It marks the right shoulder of Orion. It is an irregularly variable star and at some times is noticeably more brilliant than at others.

Taurus, The Bull, charging with lowered head upon Orion from the northwest

with eye of fiery red marked by Aldebaran in the Hyades, is another of the most noted constellations, containing as it does the two famous clusters, The Hyades and The Pleiades. In the latter group one should be able to detect, without telescopic aid, the seven stars that outline a small, dipper-shaped configuration. Some claim to have seen as many as eleven stars in this cluster in high altitudes under exceptionally fine seeing conditions. There are actually several hundred stars that are members of this famous cluster.

At no time of year will one find more stars of first and second magnitude, or brighter above the horizon at one time, than in this mid-winter month. Orion alone contains two stars brighter than first magnitude, five of second magnitude and two of third magnitude. Auriga, north of Orion, has one — Capella, brighter than first magnitude — two of second and three of third magnitude. Both Auriga and Gemini are among the most brilliant constellations in the sky.

Canis Major and Canis Minor, the Greater and Lesser Dogs are noted for their brilliant Dog-Stars, Procyon and Sirius, the latter being the most brilliant of all the stars. Of the twenty brightest stars in the heavens, eight are visible in February evening skies in the mid-latitudes of the northern hemisphere. They, with the many second magnitude stars now above the horizon, account for the exceptional splendor of our heavens at this time of year, which is further enhanced by the brilliancy of the Milky Way extending across the winter sky from Cassiopeia through Perseus, Auriga, Gemini, and Monoceros to the southern horizon.

There will be, in February, three conjunctions of planets in the evening sky. Mars and Jupiter will be in conjunction on February 7 in the western sky. Mars will be then very close to Jupiter and to the north of it. On February 11 Venus and Jupiter will be in conjunction, with Venus south of Jupiter. On February 15 Venus and Mars will be in conjunction with Venus about half a degree south of Mars. All three of these planets will be found far over in the western sky this month. Venus is improving in position as it increases its distance from the sun, but Jupiter and Mars are gradually approaching the sun. Mercury is in the morning sky this month, but poorly placed for observation after the first few days of the month, when it is low in the southeast before sunrise. Saturn is now in the constellation of Virgo and rises late in the evening.

New Light on Dodo

New light on the extinct dodo is shed by the discovery of a pencil sketch of this bird, reputed to have been made from life, and found in the art files of the E. B. Crocker Art Gallery in Sacramento, California. The sketch was purchased about 1870 by the late Judge Crocker, along with

other paintings and drawings owned by Rudolf Weigel of Leipsig, Germany. The dodo sketch was filed under the label "Exotic Birds."

Roelandt Savery, a Flemish painter who died in 1639, is believed to be the only artist who sketched the dodo at the time when it roamed Mauritius Island in considerable numbers. The last bird is believed to have died in 1681. Savery made and signed the pencil sketch recently found, and also did an oil painting of the dodo for Emperor Rudolf II of Austria, who was a bird fancier. In the oil painting, however, the anatomy of the bird was so badly done, perhaps for artistic reasons, that the bird has two right feet. Anatomically, the pencil sketch is more carefully done and shows two birds and a dodo chick. It is also detailed as to feather and tail, and shows the dodo's feet to be webbed. Those who have pictured the dodo in the past have drawn upon the Savery oil; now the anatomy of the bird is more accurately known. The discovery of the drawing was made by John B. Matthew, art instructor at Sacramento Junior College and temporary director-manager of the Crocker gallery.

Forest Fire Losses

Acres burned last year in national forests nearly doubled the burn of 1949, according to figures from the U.S. Forest Service. This was largely due to severe fire conditions in the Southwest and California, where the worst conditions in 25 years prevailed. By September 30, 1950, 324,414 acres of land within national forests had been devastated by fire, as compared with 171,751 acres for the first nine months of 1949.

Interesting Arithmetic

"Ranger 'Rithmetic" is the title of the most recent teaching aid to be released by the U.S. Forest Service. This is a pamphlet containing mathematics problems that help teach conservation. They are ready for immediate use by the teacher. Copies are available free to teachers on request to the U.S. Forest Service, Washington, D.C., but cannot be supplied in quantity for pupils.

Trees as Hobbies

Tree Trails and Hobbies. By Ruth Cooley Cater. New York. 1950. Doubleday and Company. 324 pages. Illustrated. \$3.50.

This is a tree book with a difference. While it presents identification material on trees, and discusses the habitats, characteristics, appearance, and oddities of trees, it then goes further. It is the author's belief that many are overlooking the possibilities of trees as a hobby. She sets out, therefore, to blaze hobby trails into the forest; to show how intimate acquaintance with trees may be both fascinating and valuable. In accomplishing all the ends she set out for herself, the author has also made a most readable book.

Horse Stories

A Treasury of Horse Stories. Edited by Margaret Cabell Self. New York. 1950. A. S. Barnes and Company. 368 pages. Illustrated by Edwin Magargee. \$3.75.

Here is an anthology of equine stories that will delight any lover of horses. The author has collected these from all parts of the world and from the literature of many countries, and her choice is excellent. However, we were sorry to see that Black Beauty, horse classic of our youth, is not included.

Bandelier Birds

"Birds of Bandelier" is the title of a pamphlet by Henry H. Collins, Jr. designed to introduce the visitor to Bandelier National Monument to the avian residents of this reservation. The treatment is popular, providing information essential to identification, a list of birds reported from the Monument and a color key to its birds. The pamphlet is available from Southwestern Monuments Association, Box 2011 C, Santa Fe, New Mexico, at fifteen cents.

Exchange

From C. H. Phillips, The Post Office, Far Sawrey, Ambleside, England, comes a request to be placed in touch with others interested as he is in moths and butterflies. He would like to exchange both live specimens and literature on the subject.

Lepidopterists

From the Abellana High School Lepidopteran Club, Cebu City, Cebu, Philippines, comes word that the Club would like to get in touch with other similar clubs in the United States. Members would like to exchange specimens of Philippine butterflies for species elsewhere. Ledimila Amigable is president of the Club.

Woodswise

"When You Are in the Woods" is the title of an attractive and valuable 48-page pamphlet by Fay Welch, special lecturer on forest recreation. It is published by the College of Forestry, Syracuse University, Syracuse, New York. The title is indicative of its contents, and the advice provides for proper use of the woods and for thorough enjoyment of experiences in them.

Swans Decrease

Fewer adult trumpeter swans were recorded this year for the Red Rocks Lake Refuge and Yellowstone National Park, the annual census showing a population of 376 birds as compared with 451 recorded in August, 1949. Although some of the birds are known to have died for various reasons, the loss does not account for the decrease, and biologists are of the opinion that there has been some dispersal of the birds to other breeding grounds.



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UNDER THE MICROSCOPE

By JULIAN D. CORRINGTON

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THE CLEAVAGE OF EGGS

MOST people think of biological principles (if, as, and when they think of biological principles), such as adaptation to environment, as applying only to adult organisms. The monkey is adapted for climbing by possession of grasping hands and feet; the horse is adapted for running over hard ground with sturdy hoofs. As a matter of course such principles must apply at all stages of the life cycle. Thus, the single-celled egg, the various cleavage stages, the embryo — each must be so organized as to conform to the requirements of its surroundings. That this fact is not so widely recognized is just another way of saying that most people do not realize that each of these stages, in its turn, represents the whole animal.

In one of the most commonly studied and familiar of creatures, the frog, the stages of embryology, as described in this Department for March, 1943, begin with the single-celled fertilized egg, or *zygote*. Technically, this egg is just as much a frog as is the adult, whose appearance always comes to mind when the word "frog" is mentioned. If properly formed, of normal hereditary makeup, and if reared in a suitable environment and suffering no accidents, this egg will develop through regular sequences into the adult frog. It cannot grow into a rosebush or a centipede, but only into a frog, and one of the particular species and clan as were its parents.

As one result of fertilization, this zygote undergoes cell division by a mitosis in which the chromosomes contributed by each of the parents are brought together upon a common spindle, and divide so that each of the two daughter cells receives a full complement, each precisely like the other. To picture this in imagination, let us presume the male has furnished six red chromosomes and the female six blue ones. These twelve are arrayed on a mitotic spindle and each splits lengthwise, making 12 reds and 12 blues. Six reds and six blues go to each pole of the spindle, and each daughter cell thus gets 12 chromosomes, each the counterpart of the 12 received by the other daughter cell. In this imaginary case, the diploid number of chromosomes is 12 and the monoploid number 6.

The first cleavage division thus initiates the life of the new individual, bringing its essential chromosomes together for the first time. But it does more. It establishes a visible polarity inasmuch as the

first cleavage plane is longitudinal. The first division is not a typical mitosis. For one thing, it is not just an ordinary cell that is dividing — it is an entire animal. For another, the division is not followed by growth, as in later mitoses, but by another division. The usual sequence, as in mitoses of adult cells, is that a division is followed by growth so that each of the daughter cells acquires full size; then they may be ready to divide again. If we let M = mitosis and G = growth, then body cells, like those of our skin or blood, have a career indicated by M - G - M - G - M - G - etc., whereas cleavage cells pursue such a course as M - M - M - M - etc., with the result that the ball of many cells is no larger than the zygote. Cleavage accomplishes reduction in cell size to normal or average for the species. The zygote is large or even enormous as cells go; by cutting it up into many small cells, the ratio of surface to mass in each cell is brought back to normal, and the way paved for further elaboration of structures through the formation of sheets or layers of cells.

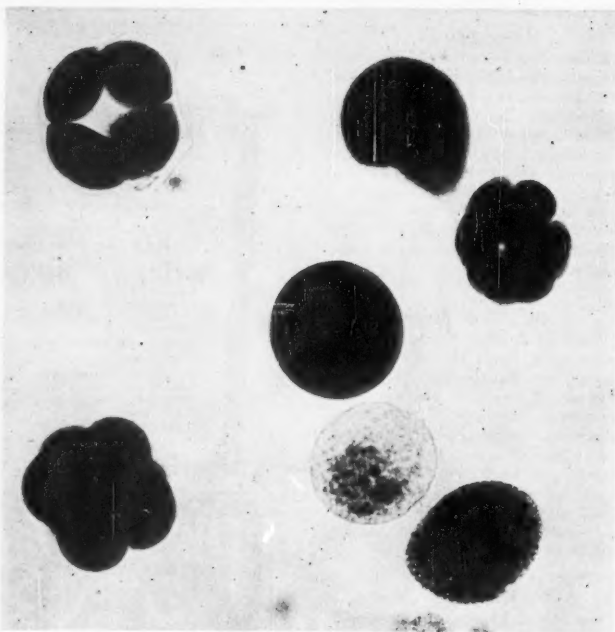
The proper name for the animal after the first cleavage division is *two-celled stage* (of cleavage), the part in parentheses being implied. After the two daughter cells have divided, more or less simultaneously, the organism is a *four-celled stage* then, after yet another cleavage, an *eight-celled stage*, and so on, ideally doubling the number each time through 16, 32, and 64, to many-celled stages, any of which may be called a *morula* (mulberry), and finally to the end product, the *blastula* (little bud). Cus-

tomarily, although incorrectly, any of these cleavage stages, and even later ones, is dubbed an "egg."

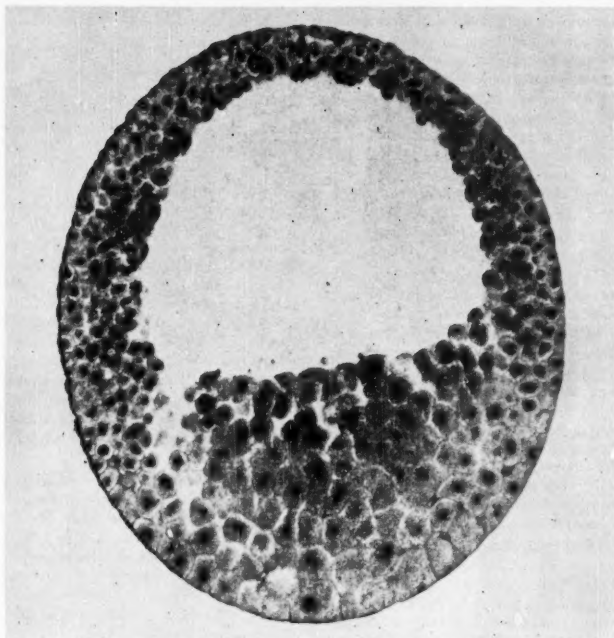
Cleavage is followed by gastrulation, an entirely different process, after which the organism may be termed an embryo. The blastula may be defined as a hollow ball of cells, one layer in thickness; each cell is a *blastomere*, the central cavity is the *blastocoel*.

Going back now to early cleavage, the second division occurs as soon as the first is completed, and is also longitudinal, but at right-angles to the first. In making a comparison with the globe of the earth, these first two cleavage planes are said to be *meridional*. The third cleavage is horizontal or latitudinal. In the mathematically perfect or ideal egg cell — something that does not exist in reality — this third cleavage should be equatorial. The next or fourth should be a simultaneous division of all eight cells in the meridional plane, and the fifth should divide all sixteen cells horizontally, the two cleavage furrows corresponding to the Tropics of Cancer and Capricorn. This alternation of longitudinal and horizontal cleavages should continue until the end.

That actual eggs do not follow this hypothetical performance is the fault of nutritional requirements. One of the accomplishments of cleavage, as we have seen, is the restoration of normal cell size. Another is the distribution of chromosomes to all the daughter cells, evenly and properly, whereby heredity is served. But meanwhile, to provide fuel for the business of living and for the energy necessary to en-



Starfish, early cleavage, 185X.



Blastula, vertical section, 60X

gineer the many divisions, the organism must eat. Not being equipped during these cleavage stages with any devices for securing food, the essential materials must be supplied by the preceding generation, and it is the maternal habit to see to it that stored food is packed into the egg cell, sufficient in quantity to last through to that time when the embryo or larva becomes self-sustaining. In the chick, for example, there must be food for twenty-one days, the period of incubation. This stored food is the *yolk*, also called *deutoplasm*, or secondary plasma, a term designed to contrast with protoplasm.

Although required, the presence of this yolk certainly raises havoc with the picture of orderly cleavage divisions we have outlined, for it is inert and non-living and must be handled and organized by the living protoplasm. So to speak, cleavage furrows pass through the cytoplasm of yolk-poor eggs with ease, but force their way through the sluggish mass of yolk-rich eggs with great difficulty, if at all.

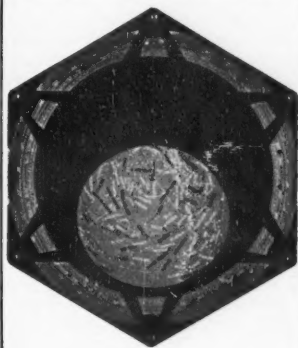
The ideal egg is termed *alecithal* (without-yolk), pronounced a-lec-i-thal. The protoplasm is uniform in composition throughout the cell and there is no yolk. Cleavage is total or *holoblastic*, and is *equal*, the resulting blastomeres being all of the same size. All cells supposed to divide, say, horizontally, at the same time, do so simultaneously, and horizontal divisions alternate with meridional ones, the total number of cells doubling with each division. But there is no egg that doesn't have at least a small amount of yolk, for

there is no animal that is independent in nutritive matters while still in the zygote or cleavage stages.

The nearest approach to the ideal condition is found in echinoderm eggs, as those of the starfish and sea urchin, and somewhat less so in amphioxus, one of the earliest vertebrate relatives. Such eggs are termed *microlecithal* (little-yolk), although some writers employ *alecithal* for such cases. Furthermore, the yolk approaches the condition of being uniformly distributed throughout the cell, called *isolecithal* or *homolecithal*. The specific gravities of protoplasm and deutoplasm are unlike the latter being heavier. These materials assort, resulting in a concentration of protoplasm in the upper portion, or *animal pole*, and a concentration of deutoplasm in the lower or *vegetal pole*. Because of this difference in specific gravity, aquatic eggs float with the animal pole uppermost; if a frog egg is turned upside down within its jelly envelope, it will rotate to restore the original position. Accordingly, no egg with yolk, which is to say no actual egg, is strictly *isolecithal*, but the term is used for those eggs, as the starfish, in which the distribution is not markedly unequal. Echinoderm eggs are cheap and easy to secure; amphioxus eggs expensive; either are used to show the nearest approach to the primitive scheme of cleavage, in studying embryology.

The second type is exemplified by the frog. Here the amount of yolk is considerably greater, although moderate by comparison with higher types; a term we wish

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to propose for this condition is *metrolecithal* (moderate-yolk), better etymologically than the sometimes-used *oligolecithal* (little-yolk), which should be synonymous with *microlecithal*, and better comparatively than *telelecithal*, which refers to distribution in yolk-rich eggs, as the chick, and not to absolute amount. A suitable term for distribution in the amphibian egg is *anisolecithal* (unequal-yolk). The effect on cleavage of this increase in

rolecithal and telelecithal. Mammalian cleavage is holoblastic and equal but the blastomeres come to be arranged in two very different groups — an outer hollow sphere, one cell in thickness, the *trophoblast* (*trophoderm*, *trophectoderm*) and an *inner cell mass*, a ball of cells attached to the upper pole of the hollow sphere. The entire structure at the blastula stage is termed biologically a *blastocyst* or *blastodermic vesicle*.

The outer layer of this vesicle, the trophoblast (feeding-layer) serves temporarily to implant the "egg" (now actually not an egg but a blastula) and secure nourishment by absorption of uterine secretions (uterine "milk"). The empty vesicle corresponds to the yolk-filled structure of reptiles and birds which, much later than the blastula stage, becomes surrounded by a cellular envelope, the yolk-sac; the inner cell mass alone develops into the embryo and corresponds to the blastodisc of reptiles and birds. After cleavage, this mass is termed the *blastoderm* in these two lower groups of vertebrates, but *blastocyst* in mammals.

Three types of the end product of cleavage are recognized: the *coeloblastula* or hollow ball of cells seen in starfish and frog, the *discoblastula* or cap of cells atop a large ball of yolk in the chick, and the *blastocyst* that is to be found in placental mammals.

A fifth and final form of cleavage, unrelated in evolutionary sequence to the foregoing vertebrate types, occurs in arthropods. In the insect order Collembola, the egg undergoes holoblastic and equal cleavage, but in all other orders thus far investigated there is meroblastic cleavage. The egg is designated as *centrolecithal* or *mesolecithal*, with the yolk in the center, surrounded by a clear area of cytoplasm; cleavage is *superficial*, only the peripheral protoplasm dividing.

According to still another classification, cleavage is either *indeterminate* or *regulation-type*, in which the earlier blastomeres, if artificially separated, will each develop into a complete embryo, or it is *determinate* or *mosaic-type*, an estate in which early blastomeres, experimentally separated, will form only partial embryos. Other experimental work has shown the presence in the egg of organizers and organ-forming substances unknown to former generations of embryologists. Transplants, grafts, and hybrid monsters can be manufactured at will, and two separate cleavage stages fused to make one animal; but further description of this sort lies beyond our present scope.

Those who may wish to study cleavage or mount slides of various stages may purchase a vial of mixed stages of starfish or sea urchin "eggs" from any of the biological supply houses, and may either purchase or collect and rear their own frog cleavages. In birds and mammals cleavage takes place while the zygote is traveling down the oviduct and specimens are obtained only rarely and are not commercially available.



Eight-celled stage, cleavage, frog, 40X.

amount of yolk and its unequal distribution is seen in the third division, which is not equatorial, but conspicuously above that line. While the whole egg divides, cleavage being holoblastic, it is *unequal*, resulting in four cells around the animal pole that are definitely smaller (*micromeres*) than those around the vegetal pole (*macromeres*).

In the third type, shown by reptiles, birds, and many fishes, there is an enormous amount of yolk, the protoplasm being a tiny disc (*blastodisc*, *germinal disc*) lying on the great ball of yolk like an island in the sea. Such eggs are *macrolecithal* or *megalecithal* (large-yolk) in amount and *telelecithal* (terminal-yolk) in distribution. No longer is the protoplasm able to organize this huge mass into separate cells, so only the blastodisc cleaves, the type being *meroblastic* (partial) in amount, and *discoidal* in shape. One might think of the egg as trying to divide up as usual, fancifully speaking, but, being unable to do so, does the best it can, and divides the living protoplasm. The monotremes or egg-laying mammals, as the duckbilled platypus, lay large-yolked eggs of this classification.

A fourth kind of development, seen in mammals above monotremes, is perhaps the most interesting of all. Here the egg reverts to the earliest type, being microscopic in size, or barely visible to the unaided eye. It is secondarily *microlecithal* and *isolecithal* inasmuch as, very early in its post-fertilization career, it makes connection with the mother so as to tap a new source of life's necessities. The former large supply of yolk is no longer necessary, but in its cleavage the egg acts reminiscently and behaves as though it were mac-

B & L ENGINEER DIES

HARRY G. Ott, one of America's leading optical engineers and assistant to Carl L. Bausch, Vice-President in charge of Research and Engineering at the Bausch & Lomb Optical Company, died November 21, 1950, aged 56.

Born in Brookings, S. D., he graduated from the University of Chicago, and was production manager at the Spencer Lens Company before joining Bausch & Lomb. During World War II, Mr. Ott assisted in the development of aerial camera lenses and photogrammetric equipment for the U. S. Air Force, and worked with the National Defense Research Council, in Washington. He also served as a director of the American Society of Photogrammetry, a member of the Army Ordnance Association, Optical Society of America, and the Photogrammetric Advisory Committee of Syracuse University.

Mr. Ott has been a member of Bausch & Lomb's Military Engineering Department for the past eleven years and its head since 1948. He was instrumental in designing and producing optical gunfire control equipment for both the Army and the Navy, including rangefinders, heightfinders, tank sights, and submarine periscopes.

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